



Switchgear Type 8DH10 up to 24 kV, **Gas-Insulated**, Extendable

Medium-Voltage Switchgear

Catalog HA 41.11 · 2008

Answers for energy.

SIEMENS

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For further information, please refer to	
<ul style="list-style-type: none"> Catalog HA 40.1: (Switchgear Type 8DJ and 8DH, General Part) Supplements to Catalogs HA 45.31/41.11 	



The products and systems described in this catalog are manufactured and sold according to certified quality and environmental management system (acc. ISO 9001 and ISO 14001). (DQS Certificate Reg. No. DQS 003473 QM UM). The certificate is accepted in all IQNet countries.

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Application, Requirements

Features

8DH10 switchgear is a factory-assembled, type-tested, three-pole, metal-enclosed, metal-clad single-busbar switchgear for in-door installation:

- Up to 24 kV
- Feeder currents up to 630 A
- Busbar currents up to 1250 A

Typical uses

8DH10 switchgear is used – even under severe environmental conditions – for power distribution in secondary distribution systems, such as

- Substations, customer transfer substations, distribution substations and switching substations of power supply and public utilities
- Industrial plants, such as:
 - Wind power stations
 - High-rise buildings
 - Airports
 - Lignite open-cast mines
 - Underground railway stations
 - Sewage treatment plants
 - Port facilities
 - Traction power supply systems
 - Automobile industry
 - Petroleum industry
 - Chemical industry
 - Cement industry
 - Unit-type heating power stations
 - Textile, paper and food industry
 - Emergency power supply installations

Modular design

- Individual panels and panel blocks can be freely combined and extended – without gas work on site
- Low-voltage compartments can be supplied in two overall heights and are wired to the panel by means of plug-in connections

Reliability

- Type and routine-tested
- Standardized and manufactured using numerically controlled machines
- More than 500,000 8DJ/8DH panels in operation worldwide for many years

Quality and environment

Quality and environmental management system acc. to DIN EN ISO 9001 and DIN EN ISO 14001

Personal safety

- Safe-to-touch and hermetically sealed primary enclosure
- HV HRC fuses and cable sealing ends are only accessible when outgoing feeders are earthed
- Operation only possible when enclosure is closed
- Logical mechanical interlocking
- Capacitive voltage detecting system to verify safe isolation from supply
- Feeder earthing by means of make-proof earthing switches

Security of operation

- Hermetically sealed primary enclosure independent of environmental effects (such as pollution, humidity and small animals) – sealed for life:
 - Welded switchgear vessel
 - Welded-in bushings and operating mechanism
- Operating mechanism parts maintenance-free (IEC 62271-1 / VDE 0671-1)
- Operating mechanisms of switching devices located outside the switchgear vessel (primary enclosure)
- Switchgear interlocking system with logical mechanical interlocks
- Mechanical switch-position indicators integrated in the mimic diagram

Cost-efficiency

Extremely low “life-cycle costs” throughout the entire product service life as a result of:

- Maintenance-free concept
- Climatic independence
- Minimum space requirements
- Maximum availability

Security of investment

Innovative developments, such as:

- Modular design
- Switchgear extension without gas work on site
- Maintenance-free 3AH vacuum circuit-breaker
- SIPROTEC protection device family

Technology

- Maintenance-free
- Climate-independent
- Partition class: Class PM (metallic partition)
- Three-pole primary enclosure, metal-enclosed
- Insulating gas SF₆
- Welded switchgear vessel without seals, made of stainless steel, with welded-in bushings for electrical connections and mechanical components
- Three-position switch-disconnector with load-break and make-proof earthing function
- Cable connection for bushings with outside cone
- Connection with cable plugs
 - In ring-main feeders and circuit-breaker feeders with bolted contact (M16)
 - In transformer feeders with plug-in contact
- Option: Connection with conventional cable sealing ends
 - For thermoplastic-insulated cables via elbow adapter AKE 20 / 630 (make Siemens)
 - For paper-insulated mass-impregnated cables via commercially available adapter systems
- Easy installation
- Option: Pressure absorber system
 - Maintenance-free
 - For rated short-time withstand current $I_k \leq 20 \text{ kA}$
 - For single and multi-panel combinations of 700 mm to 2000 mm width (for panel type ME1 with max. 1 adjacent panel)
 - With 300 mm high pressure absorber duct below the switchgear and
 - With 115 mm deep pressure absorber duct for pressure relief upwards
 - With screwed-on cable compartment cover
 - Possible for switchgear with standard cable compartment cover
- Option: Deeper cable compartment cover: 105 or 300 mm
- For overall height of switchgear, see page 6
- Option: Free-standing arrangement, for overall height of switchgear 2300 mm and with rear cover

For further information concerning the pressure absorber system, please refer to page 39 and to Catalog HA 40.1

Standards

See page 41



Example
Customer transfer switchgear



Application
Customer transfer substation in an accessible switchgear building (transformers, medium-voltage and low-voltage in a factory-assembled building)

Application
Power supply of high-rise buildings

Technical Data

Electrical data

Common electrical data	Rated insulation level	Rated voltage U_r	kV	7.2	12	15	17.5 Δ	24
		Rated short-dur. power-freq. withstand voltage U_d :						
		– phase-to-phase, phase-to-earth, open contact gap	kV	20	28 ¹⁾	36	38 Δ	50
		– across the isolating distance	kV	23	32 ¹⁾	39	45	60
		Rated lightning impulse withstand voltage U_p :						
		– phase-to-phase, phase-to-earth, open contact gap	kV	60	75 ¹⁾	95	95	125
		– across the isolating distance	kV	70	85 ¹⁾	110	110	145
	Rated frequency f_r			50/60 Hz				
	Rated normal current I_r ²⁾	for busbar (standard)	up to A	630	630	630	630	630
		for busbar (option) ^{*)}	A	1250	1250	1250	1250	1250
Filling pressure, temperature, partition class and classification	Rated filling level p_{re}	for insulation		150 kPa (absolute) at 20 °C				
	Min. functional level p_{me}	for insulation		130 kPa (absolute) at 20 °C				
	Ambient air temperature T ³⁾	Panels without secondary equipment	Class	"Minus 25 indoor" (-25 to +70 °C ⁴⁾)				
		Panels with secondary equipment, circuit-breaker panels	Class	"Minus 5 indoor" (-5 to +55 °C ⁴⁾)				
	Partition class		Class	PM (metallic partition)				
	Loss of service continuity category ⁵⁾	LSC (loss of service continuity)		LSC 2				

Panel data

Ring-main panel type RK, bus sectionalizer panel type LT2, cable panel type K	Rated normal current I_r ²⁾	for feeder (for panel types RK ... and K ...)	A	400, 630	400, 630	400, 630	400, 630	400, 630
		for bus sectionalizer panel type LT2	A	400, 630	400, 630	400, 630	400, 630	400, 630
	Rated short-time withstand current I_k	for switchgear with $t_k = 1$ s	up to kA	20	25	20	25	20
		for switchgear with $t_k = 3$ s (option)	up to kA	–	–	20	–	20
	Rated peak withstand current I_p		up to kA	50	63	50	63	50
	Rated short-circuit making current I_{ma}		up to kA	50	63	50	63	50

Transformer panel type TR	Rated normal current I_r ²⁾	for feeder ⁶⁾	A	200	200	200	200	200
	Rated short-time withstand current I_k	for switchgear with $t_k = 1$ s	up to kA	20	25	20	25	20
		for switchgear with $t_k = 3$ s	up to kA	–	–	20	–	20
	Rated peak withstand current I_p ⁶⁾		up to kA	50	63	50	63	50
	Rated short-circuit making current I_{ma} ⁶⁾		up to kA	25	25	25	25	25
	Reference dimension "e" of the HV HRC fuse links		mm	292 ⁷⁾	292	442	442	442

Circuit-breaker panel type LS, bus sectionalizer type LK/LT1	Rated normal current I_r ²⁾	for feeder (for panel types LS ...)	A	400, 630	400, 630	400, 630	400, 630	400, 630
		for bus sectionalizer panel type LT1	A	400, 630	400, 630	400, 630	400, 630	400, 630
	Rated short-time withstand current I_k	for switchgear with $t_k = 1$ s	up to kA	20	25	20	25	20
		for switchgear with $t_k = 3$ s	up to kA	–	–	20	–	20
	Rated peak withstand current I_p		up to kA	50	63	50	63	50
	Rated short-circuit making current I_{ma}		up to kA	50	63	50	63	50
	Rated short-circuit breaking current I_{sc} ⁸⁾		up to kA	20	25	20	25	20
	Electrical service life of 3AH vacuum circuit-breakers	at rated normal current		10 000 operating cycles				
		at rated short-circuit breaking current		50 breaking operations				

*) Not for billing metering panels type ME1		Higher values of the rated lightning impulse withstand voltage (for $I_k = 20$ kA): – 95 kV for phase-to-phase, phase-to-earth and open contact gap as well as – 110 kV across the isolating distance	3) Operating conditions according to IEC 62271-200. For application, see also pages 2 and 41 (climate and ambient conditions)	6) Depending on the HV HRC fuse link, observe the max. let-through current of the HV HRC fuse links			
Δ) Data for Russian Federation: – Rated voltage 12 kV – Rated Short-duration power-frequency withstand voltage 42 kV							
1) According to some national requirements, higher values of the rated short-duration power-frequency withstand voltage available for $I_k = 20$ kA with: – 42 kV for phase-to-phase, phase-to-earth and open contact gap as well as – 48 kV across the isolating distance		2) The rated normal currents apply to ambient air temperatures of max. 40 °C. The 24-hour mean value is max. 35 °C (according to IEC 62271-1 / VDE 0671-1)	4) Temperature range, reduced normal currents at ambient air temperatures > +40 °C	7) Extension tube (150 mm long) required additionally for fuse mounting 442 mm			
5) Classification according to IEC 62271-200 (see also page 42)							
8) For the 3AH vacuum circuit-breaker							

Technical Data

Electrical data

Common electrical data	Rated insulation level	Rated voltage U_r	kV	7.2	12	15	17.5 Δ	24
		Rated short-dur. power-freq. withstand voltage U_d :						
		– phase-to-phase, phase-to-earth, open contact gap	kV	20	28 ¹⁾	36	38 Δ	50
		– across the isolating distance	kV	23	32 ¹⁾	39	45	60
		Rated lightning impulse withstand voltage U_p :						
		– phase-to-phase, phase-to-earth, open contact gap	kV	60	75 ¹⁾	95	95	125
		– across the isolating distance	kV	70	85 ¹⁾	110	110	145
	Rated frequency f_r			50/60 Hz				
	Rated normal current I_r ²⁾	for busbar (standard)	up to A	630	630	630	630	630
		for busbar (option) ^{*)}	A	1250	1250	1250	1250	1250
Filling pressure, temperature, partition class and classification	Rated filling level p_{re}	for insulation		150 kPa (absolute) at 20 °C				
	Min. functional level p_{me}	for insulation		130 kPa (absolute) at 20 °C				
	Ambient air temperature T ³⁾	Panels without secondary equipment	Class	"Minus 25 indoor" (-25 to +70 °C ⁴⁾)				
		Panels with secondary equipment, circuit-breaker panels	Class	"Minus 5 indoor" (-5 to +55 °C ⁴⁾)				
	Partition class		Class	PM (metallic partition)				
	Loss of service continuity category ⁵⁾	LSC (loss of service continuity)		LSC 2				

Panel data

Busbar earthing panel type SE, busbar voltage metering panel type MS1V/ME3	Rated short-time withstand current I_k	for switchgear with $t_k = 1$ s	up to kA	20	25	20	25	20	25	20	25	20
		for switchgear with $t_k = 3$ s (option)	up to kA	–	–	20	–	20	–	20	–	20
	Rated peak withstand current I_p		up to kA	50	63	50	63	50	63	50	63	50
	Rated short-circuit making current I_{ma}		up to kA	50	63	50	63	50	63	50	63	50

Billing metering panels types ME1 and ME2	Rated normal current I_r ²⁾	for transfer	up to A	630	630	630	630	630	630	630	630	630
		for feeder (T with cable panel as type ME1-K)	up to A	630	630	630	630	630	630	630	630	630
		for busbar metering	up to A	630	630	630	630	630	630	630	630	630
	Rated short-time withstand current I_k	for switchgear with $t_k = 1$ s	up to kA	–	25	20	25	20	25	20	25	20
		for switchgear with $t_k = 3$ s	up to kA	20	–	20	–	20	–	20	–	20
	Rated peak withstand current I_p		up to kA	50	63	50	63	50	63	50	63	50

*) Not for billing metering panels type ME1

Δ) Data for Russian Federation:
– Rated voltage 12 kV
– Rated Short-duration power-frequency withstand voltage 42 kV

1) According to some national requirements, higher values of the rated short-duration power-frequency withstand voltage available for $I_k = 20$ kA with:
– 42 kV for phase-to-phase, phase-to-earth and open contact gap as well as
– 48 kV across the isolating distance

Higher values of the rated lightning impulse withstand voltage (for $I_k = 20$ kA):
– 95 kV for phase-to-phase, phase-to-earth and open contact gap as well as
– 110 kV across the isolating distance

2) The rated normal currents apply to ambient air temperatures of max. 40 °C. The 24-hour mean value is max. 35 °C (according to IEC 62271-1 / VDE 0671-1)

3) Operating conditions according to IEC 62271-200.

For application, see also pages 2 and 41 (climate and ambient conditions)

4) Temperature range, reduced normal currents at ambient air temperatures > +40 °C

5) Classification according to IEC 62271-200 (see also page 42)

Technical Data

Switchgear installation

Room planning

Switchgear installation

Wall-standing arrangement

- Single row
- Double row (for face-to-face arrangement)

Option: Free-standing arrangement

For room planning and switchgear installation, please note:

- Floor openings: Dimensions see pages 36 to 39
- Direction of pressure relief acc. to serial no. 13
- Respective pressure relief rooms

Room dimensions see opposite dimension drawings

Door dimensions

The door dimensions depend on the

- Number of panels in a transport unit
- Design with or without low-voltage compartment

Switchgear fastening

- For floor openings and fixing points of the switchgear, see pages 36 to 39
- Foundations:
 - Steel structure
 - Steel-reinforced concrete

Panel dimensions see p. 30 to 34

Weight

For details, please refer to page 7.

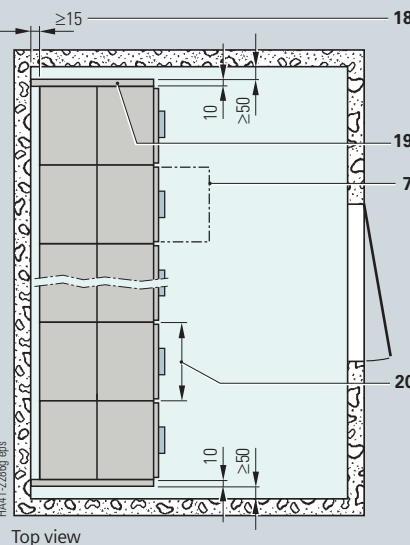
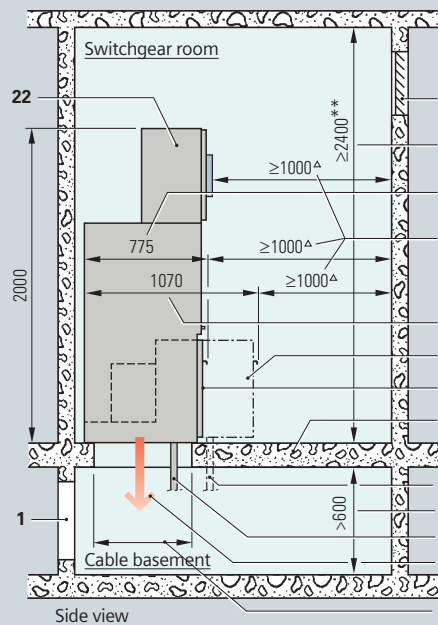
- * Switchgear height for version with pressure absorber duct:
- For wall-standing arrangement ≥ 1950 mm (panel combination without metering panel ME1)
 - ≥ 2300 mm (for combination with metering panel ME1)
 - For free-standing arrangement ≥ 2300 mm (high end walls, rear wall and front covers, optional low-voltage compartment)

- ** Installation conditions for internal arc classification acc. to IEC 62271-200

- *** Height of pressure absorber duct 2100 mm with:
- Wall-standing arrangement with metering panel ME1
 - Free-standing arrangement for all panel types

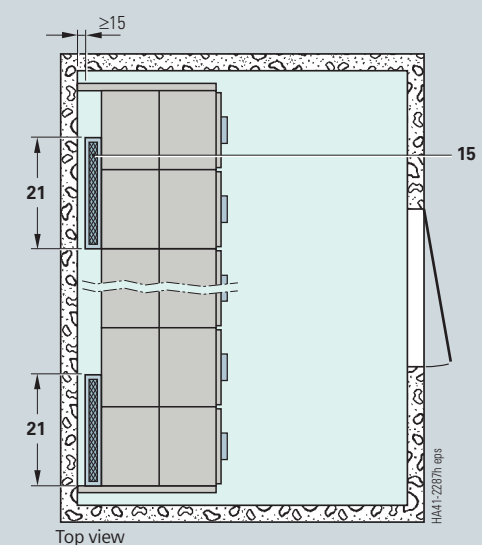
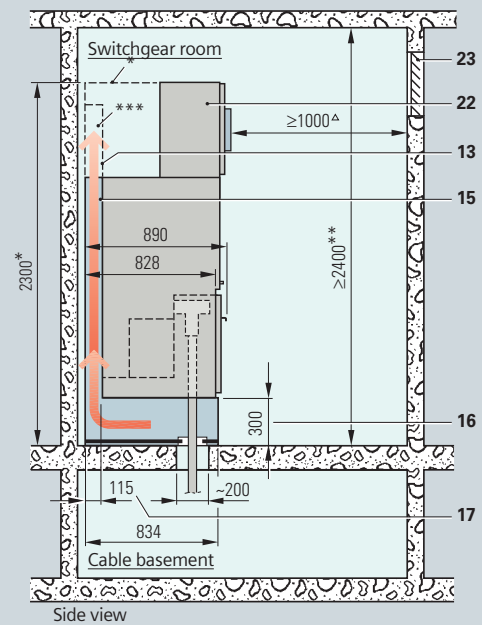
- Δ Depending on national specifications:
- For extension/panel replacement: Control aisle ≥ 1000 mm recommended (for Germany ≥ 800 mm)

Switchgear installation with standard panels



- 1 Relieving opening
- 2 Opening (e.g. for ventilation as option)
- 3 Room height
- 4 Panel depth of the standard panel (may be 15 mm deeper for free-standing arrangement, depending on the panel design)
- 5 Control aisle Δ
- 6 Panel depth of panels with deep cable compartment cover
- 7 Deep cable compartment cover
- 8 Standard cable compartment cover

Switchgear installation with rear-side pressure absorber duct (option)



- 9 Foundation
- 10 2nd cable for connection with of double T-plugs in conjunction with larger floor opening and design with deep cable compartment cover
- 11 Height of the cable basement corresponding to the cable bending radius
- 12 Cable
- 13 Direction of pressure relief
- 14 Floor openings: Dimensions see pages 34 to 37
- 15 Option: Pressure absorber duct
- 16 Base height of the pressure absorber duct beneath the panel
- 17 Depth of the pressure absorber duct behind the panel
- 18 Wall distance
- 19 End wall
- 20 Panel width
- 21 Width of the pressure absorber duct – 700 mm for panel combinations – Approx. 850 mm for metering panels type ME1
- 22 Standard: Low-voltage compartment for circuit-breaker panels
Option: Low-voltage compartment for all other panel types or Front cover
- 23 Relief outlet

Individual panel, panel block or combinations thereof for standard switchgear (without pressure relief duct)	Type Short identification ^Δ		Panel or panel combination		Transport unit (including packing) for standard panels (without pressure absorber system)				
	current	in future	Width B1 mm	Net weight ¹⁾ approx. kg without / with LVC * / LVC *	Width B2 m	Height m without / with LVC * / LVC *	Depth T2 m	Volume m ³ without / with LVC * / LVC *	Gross weight ¹⁾ approx. kg without / with LVC * / LVC *

Transport of individual panels

Ring-main panel (standard)	RK	RK	350	150 / 210	0.70	1.60 / 2.20	1.10	1.23 / 1.69	210 / 270
	RK1	RK1	500	180 / 240	0.70	1.60 / 2.20	1.10	1.23 / 1.69	240 / 300
	RK2	RK1 V	500	200 / 260	0.70	1.60 / 2.20	1.10	1.23 / 1.69	260 / 320
Cable panel (standard)	K	K	350	145 / 205	0.70	1.60 / 2.20	1.10	1.23 / 1.69	205 / 265
Transformer panel	TR	TR1	500	180 / 240	0.70	1.60 / 2.20	1.10	1.23 / 1.69	240 / 300
Circuit-breaker panel (standard)	LS1	LS1	500	– / 260	0.70	– / 2.20	1.10	– / 1.69	– / 320
	LS2	LS1 V	500	– / 380	0.70	– / 2.20	1.10	– / 1.69	– / 440
Circuit-breaker panel ^{ΔΔ}	LST1	LST1	500	280 / 340	0.70	1.60 / 2.20	1.10	1.23 / 1.69	320 / 380
Bus sectionalizer panel with circuit-breaker	LT1	LK	500	– / 280	0.70	– / 2.20	1.10	– / 1.69	– / 340
	LT1-V	LKV	500	– / 380	0.70	– / 2.20	1.10	– / 1.69	– / 440
Bus sectionalizer panel with switch-disconnector	LT2	LT	500	150 / 210	0.70	1.60 / 2.20	1.10	1.23 / 1.69	210 / 270
Busbar earthing panel	SE1	SE	350	150 / 210	0.70	1.60 / 2.20	1.10	1.23 / 1.69	210 / 270
	SE2	SE1 V	500	250 / 310	0.70	1.60 / 2.20	1.10	1.23 / 1.69	310 / 370
Busbar voltage metering panel	ME3	MS1 V	500	250 / 310	0.70	1.60 / 2.20	1.10	1.23 / 1.69	310 / 370
Billing metering panels, air-insulated **	ME1	ME1	850	250 / 310	1.08	1.60 / 2.20	1.10	1.90 / 2.61	310 / 370
	ME2	ME2	600	390 / 450	1.08	1.60 / 2.20	1.10	1.90 / 2.61	450 / 510

Transport of panel blocks

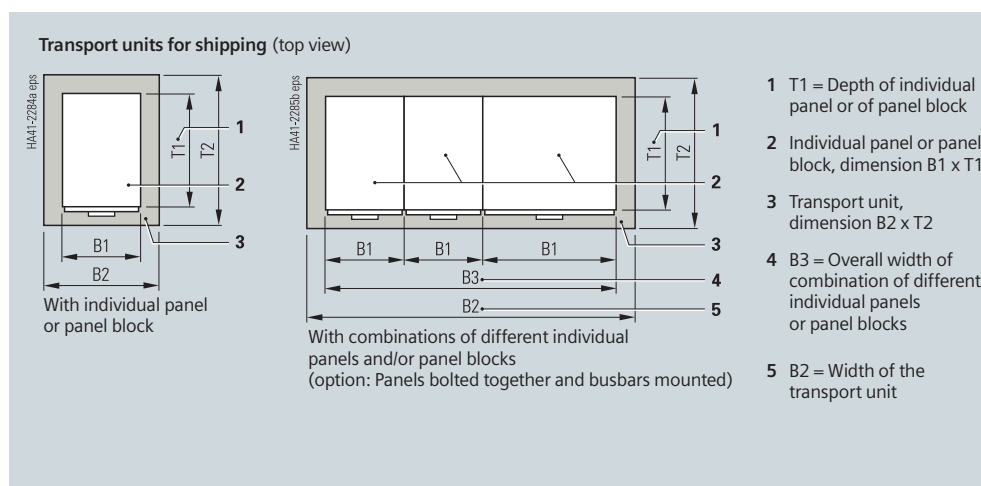
Ring-main panel block	R-B2	700	280 / 400	1.08	1.60 / 2.20	1.10	1.90 / 2.61	340 / 460
	R-B3	1050	400 / 580	1.40	1.60 / 2.20	1.10	2.46 / 3.40	470 / 650
Transformer panel block	T-B2	1000	320 / 440	1.40	1.60 / 2.20	1.10	2.46 / 3.40	390 / 510
	T-B3	1500	480 / 660	2.03	1.60 / 2.20	1.10	3.57 / 4.91	560 / 740
Ring-main/transformer panel block	RT-B2	700	300 / 420	1.08	1.60 / 2.20	1.10	1.90 / 2.61	360 / 480
	2RT-B3	1050	450 / 630	1.40	1.60 / 2.20	1.10	2.46 / 3.40	520 / 700
	3RT-B4	1400	580 / 820	2.03	1.60 / 2.20	1.10	3.57 / 4.91	660 / 900
Cable connection/transformer panel block	KT-B2	700	300 / 420	1.08	1.60 / 2.20	1.10	1.90 / 2.61	360 / 480

Transport of combinations of different individual panels or panel blocks

Comprising	Overall width B3	B2	T2		
– a number of individual panels or	≤ 850 mm	1.08	1.60 / 2.20	1.10	1.90 / 2.61
– 1 panel block or	≤ 1200 mm	1.40	1.60 / 2.20	1.10	2.46 / 3.39
– a number of panel blocks or	≤ 1800 mm	2.03	1.60 / 2.20	1.10	3.57 / 4.91
– individual panels with panel blocks	≤ 2350 mm	2.53	1.60 / 2.20	1.10	4.49 / 6.17

Δ Short identifications of the panels have been harmonized

ΔΔ Panel type LST1: Please refer to separate Catalog HA 45.31/41.11, Supplements to Catalogs HA 45.31/41.11



- 1) The **net weight** and the gross weight depend on the extent to which they are equipped (e.g. with current transformers, motor operating mechanism, deep cable compartment cover) and are therefore given as mean value

- 2) Sum of the **net weights** of individual panels and / or panel blocks

* Low-voltage compartment, 600 mm high, weight approx. 60 kg depending on the panel type and on the extent to which it is equipped

** The weights depend on the weights of the mounted transformers

*** Packing weight

Product Range

Product range overview

Designation of the individual panels and panel blocks	Panel width	Type	
		Short identifications * current	in future

Individual panels

Column no. _____

Ring-main panel	350	RK	RK
	500	RK1	RK1
	500	RK2	RK1 V
	350	RK-U	RK-U
	500	RK1-U	RK1-U
	500	RK2-U	RK1 V-U
Cable panel without earthing switch	350	K	K
	350	K-U	K-U
Cable panel with make-proof earthing switch	350	K	K
	350	K-U	K-U
Transformer panel	500	TR	TR1
	500	TR-U	TR1-U
Transformer panel with plug-in voltage transformers	500	TR-V	TR1-V
	500	TR/V	TR1/V
Circuit-breaker panel	500	LS1	LS1
	500	LS1-U	LS1-U
Circuit-breaker panel with plug-in busbar voltage transformers	500	LS2	LS1 V
	500	LS2-U	LS1 V-U
Circuit-breaker panel (with disconnecting circuit-breaker) ^{ΔΔ}	500	LST1	LST1
Bus sectionalizer (with vacuum circuit-breaker)	500	LT1	LK
	500	LT1-V	LKV
Bus sectionalizer (with switch-disconnector)	500	LT2	LT
Busbar earthing panel	350	SE1	SE
	500	SE2	SE1 V
Busbar voltage metering panel	500	ME3	MS1 V
Billing metering panel	850	ME1	ME1
	850	ME1-K	ME1-K
Billing metering panel for	busbar connection cable connection	850	ME1-S
		850	ME1-KS
Billing metering panel with combined transformers	600	ME2	ME2

Legend for pages 8 and 9

* Short identifications of the panels have been harmonized

** LV terminals as an option in the LV compartment (compartment to be ordered as an option)

Δ Three-position switch as three-position switch-disconnector (switch-disconnector CLOSED-OPEN-EARTHED)

ΔΔ Three-position switch as three-position circuit-breaker (disconnecting circuit-breaker CLOSED-OPEN-EARTHED), see Supplements to Catalogs HA 45.31/41.11-2007

- 1) The equipment applies to the entire panel block, but it is located in the first feeder panel from the left
- 2) Low-voltage terminals arranged in the low-voltage niche of the ring-main or cable feeder

Panel blocks

Column no. _____

Ring-main panel block	700	R-B2	
	1050	R-B3	
Transformer panel block	1000	T-B2	
	1500	T-B3	
Ring-main/transformer panel block	700	RT-B2	<div> <div>RK</div> <div>T</div> </div>
	1050	2RT-B3	<div> <div>RK</div> <div>T</div> </div>
	1400	3RT-B4	<div> <div>RK</div> <div>T</div> </div>
Cable connection/transformer panel block (cable panel without make-proof earthing switch)	700	KT-B2	<div> <div>K</div> <div>T</div> </div>
Cable connection/transformer panel block (cable panel with make-proof earthing switch)	700	KT-B2	<div> <div>K</div> <div>T</div> </div>

Product Range

Equipment features

- Basic equipment
- Additional equipment (option), further additional equipment on request
- Not available

[illegible]

Product Range

Ring-main, cable and transformer panels as individual panels

Ring-main panels as feeder panels	Cable panels as feeder panels	Transformer panels as feeder panels	
<p>option</p> <p>HA41-2213_1d eps</p> <p>Type RK 350 mm wide</p> <p>option</p> <p>HA41-2218_1d eps</p> <p>Type RK1 ^{1) 3)} 500 mm wide</p> <p>option</p> <p>HA41-2219_1d eps</p> <p>Option: Type RK1 V ^{1) 2) 3)} 500 mm wide</p>	<p>option</p> <p>HA41-2218_1d eps</p> <p>Type K 350 mm wide</p> <p>option</p> <p>HA41-2219_1d eps</p> <p>option</p> <p>HA41-2220_1d eps</p>	<p>option</p> <p>HA41-2223_1d eps</p> <p>Type TR1 500 mm wide</p> <p>option</p> <p>HA41-2224_1d eps</p> <p>option</p> <p>HA41-2225_1d eps</p>	<p>Three-position switch-disconnector</p> <p>HV HRC fuse</p> <p>Capacitive voltage detecting system</p> <p>Cable-type current transformer</p> <p>4MT8 plug-in voltage transformer at the cable connection</p> <p>4MT8 plug-in voltage transformer at the connection</p> <p>Cable (not included in the scope of supply)</p> <p>2nd cable (not included in the scope of supply)</p> <p>Plug-in surge arrester</p> <p>Make-proof earthing switch</p>
<p>option</p> <p>HA41-2214_1d eps</p> <p>Type RK * 350 mm wide for 2nd cable*</p> <p>option</p> <p>HA41-2215_1d eps</p> <p>Type RK * 350 mm wide with plug-in surge arresters *</p>	<p>option</p> <p>HA41-2219_1d eps</p> <p>Type K * 350 mm wide for 2nd cable *</p> <p>option</p> <p>HA41-2220_1d eps</p> <p>Type K * 350 mm wide with plug-in surge arresters *</p>	<p>option</p> <p>HA41-2224_1d eps</p> <p>Type TR1-V Δ 500 mm wide with plug-in voltage transformers</p> <p>option</p> <p>HA41-2225_1d eps</p> <p>Type TR1-V Δ 500 mm wide (105 mm deeper cable compartment cover) with plug-in voltage transformers instead of cable connection</p>	
<p>as transfer panels</p> <p>option</p> <p>HA41-2216_1d eps</p> <p>Type RK-U 350 mm wide for transfer to the right</p> <p>option</p> <p>HA41-2217_1d eps</p> <p>Type RK-U 350 mm wide for transfer to the left</p> <p>Option: Type RK1-U ³⁾ Type RK1V-U ^{2) 3)} 500 mm wide</p>	<p>as transfer panels</p> <p>option</p> <p>HA41-2221_1d eps</p> <p>Type K-U 350 mm wide for transfer to the right</p> <p>option</p> <p>HA41-2222_1d eps</p> <p>Type K-U 350 mm wide for transfer to the left</p>	<p>as transfer panels</p> <p>option</p> <p>HA41-2226_1d eps</p> <p>Type TR1-U 500 mm wide for transfer to the right</p> <p>option</p> <p>HA41-2227_1d eps</p> <p>Type TR1-U 500 mm wide for transfer to the left</p>	

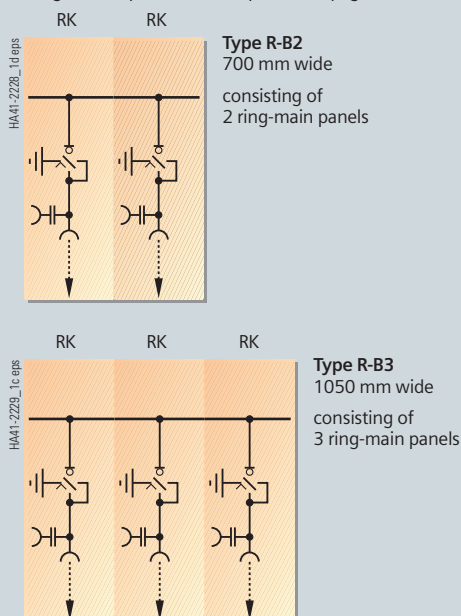
Footnotes
see page 11

Product Range

Ring-main, cable and transformer panels in panel blocks $\Delta\Delta$

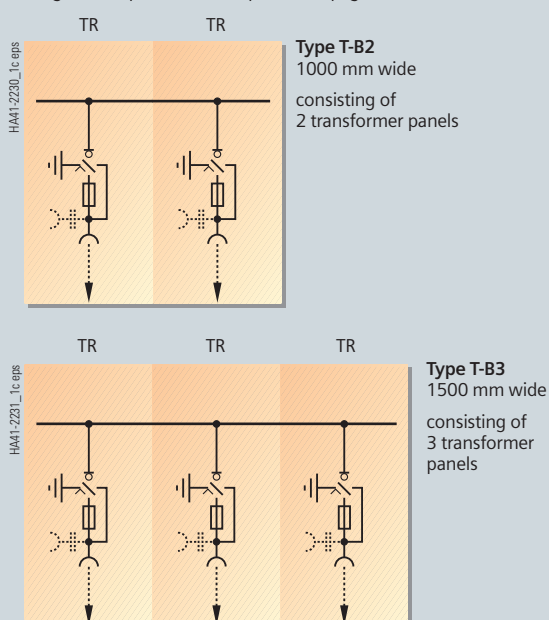
Ring-main panel blocks

Designs and options for each panel, see page 10



Transformer panel blocks

Designs and options for each panel, see page 10

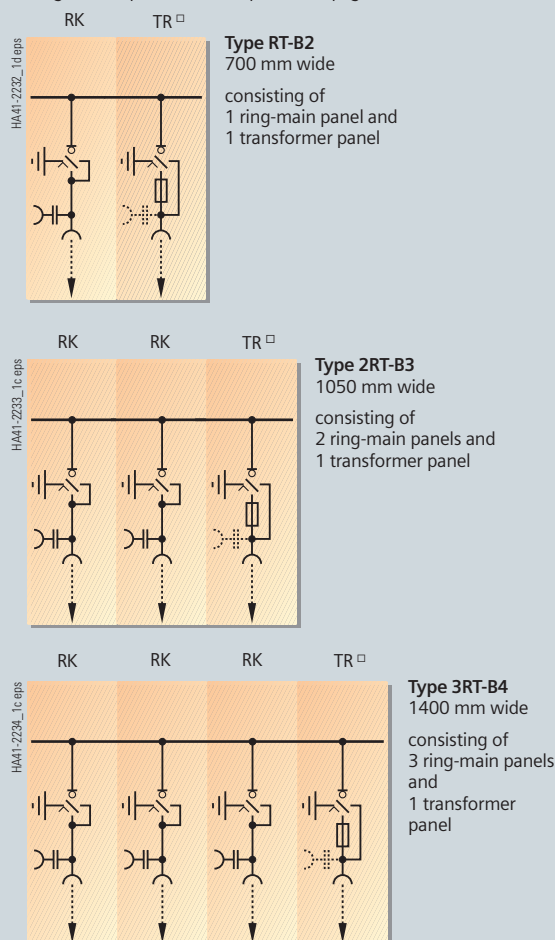


Designs

- Busbar connection system for connection of individual panels or panel blocks: Arranged in the left-hand panel of the panel block (therefore extendable at a later date)
- Only either the left-hand or the right-hand panel of the panel block can be designed as a transfer panel with busbar connection
- Panel blocks are also available without a busbar connection system (extendable at a later date only via the cable feeder)

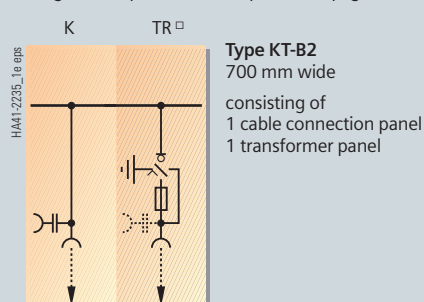
Ring-main/transformer panel blocks

Designs and options for each panel, see page 10



Cable connection/transformer panel block

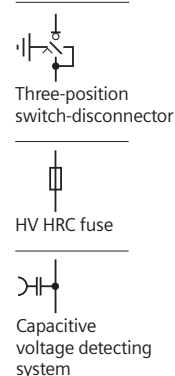
Designs and options for each panel, see page 10



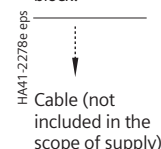
Designs

- Busbar connection system for connection of individual panels or panel blocks: Arranged in the left-hand panel of the panel block (therefore extendable at a later date)
- Only either the left-hand or the right-hand panel of the panel block can be designed as a transfer panel with busbar connection
- Panel blocks are also available without a busbar connection system (extendable at a later date only via the cable feeder)

\square A plug-in voltage transformer cannot be provided at the connection



$\Delta\Delta$ Capacitive voltage detecting system at the busbar of the panel blocks: Only located once in the first panel of the block!



Footnotes from page 10

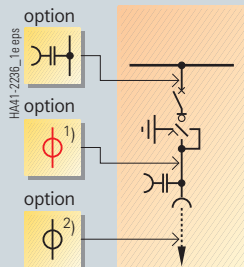
- Δ Deep cable compartment cover required
 - * Depending on the make/type of the cable plug or arrester: Deep cable compartment cover required
 - ** Cable-type current transformer on the 2nd cable: For 300 mm deeper cable compartment cover
- 1) Suitable for voltage transformer type 4MT8
 - 2) Suitable for voltage transformer type 4MT3
 - 3) Suitable for three-phase current transformers

Product Range

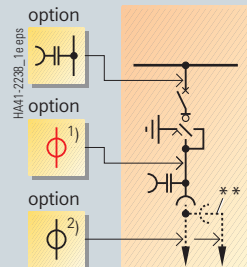
Circuit-breaker panels as individual panels $\Delta\Delta$

Circuit-breaker panels

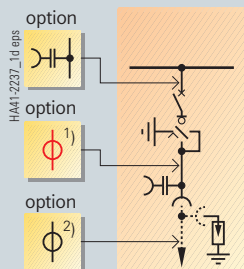
as feeder panels



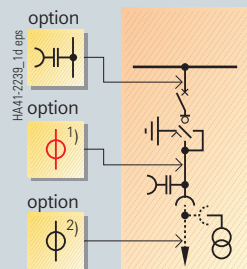
Type LS1
500 mm wide
Basic panel



Type LS1 *
500 mm wide
for 2nd cable *

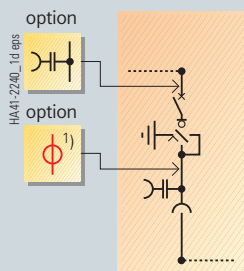


Type LS1 *
500 mm wide
with plug-in surge arresters or limiters *

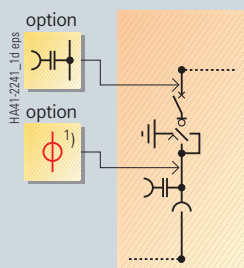


Type LS1 Δ
500 mm wide
with plug-in voltage transformers Δ

as transfer panels



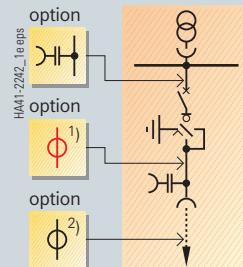
Type LS1-U
500 mm wide
for transfer to the right



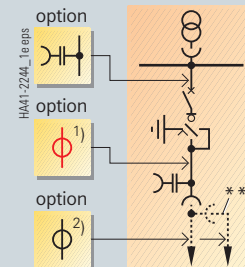
Type LS1-U
500 mm wide
for transfer to the left

Circuit-breaker panels with plug-in busbar voltage transformers

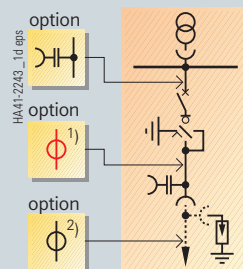
as feeder panels



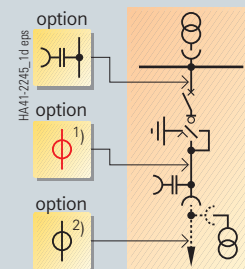
Type LS1 V/LS2
500 mm wide
Basic panel



Type LS2 *
500 mm wide
for 2nd cable *

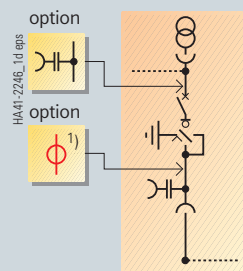


Type LS1 V/LS2 *
500 mm wide
with plug-in surge arresters or limiters *

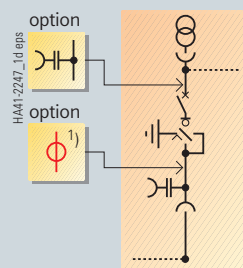


Type LS1 V/LS2 Δ
500 mm wide
with plug-in voltage transformers Δ

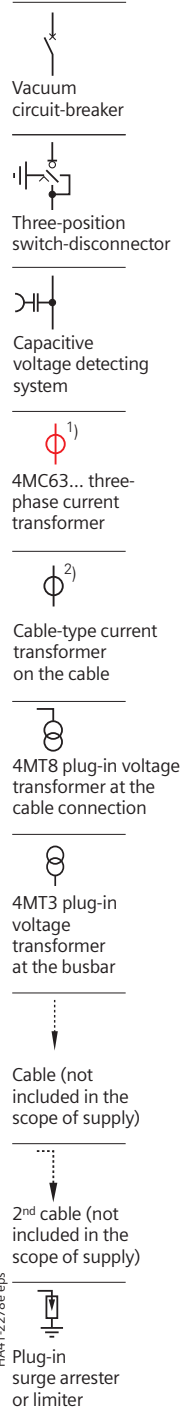
as transfer panels



Type LS1 V-U/LS2-U
500 mm wide
for transfer to the right



Type LS1 V-U/LS2-U
500 mm wide
for transfer to the left

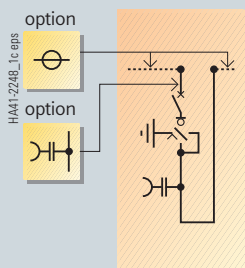


Footnotes
see page 13

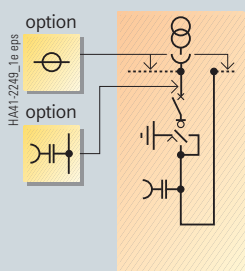
Product Range

Bus sectionalizer with circuit-breaker, bus sectionalizer with switch-disconnector, busbar earthing panels and busbar voltage metering panel as individual panels $\Delta\Delta$

Bus sectionalizer with circuit-breaker

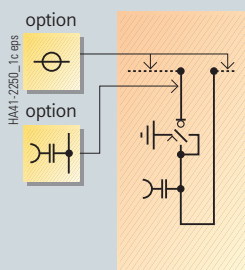


Type LK/LT1
500 mm wide
with vacuum
circuit-breaker



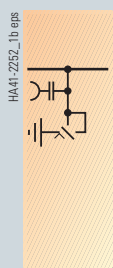
Type LK V/LT1-V
500 mm wide
with vacuum
circuit-breaker and
plug-in voltage
transformers

Bus sectionalizer with switch-disconnector

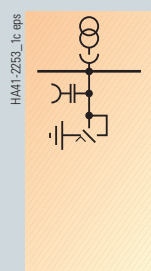


Type LT2
500 mm wide

Busbar earthing panels

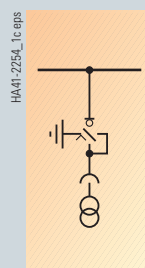


Type SE
350 mm wide

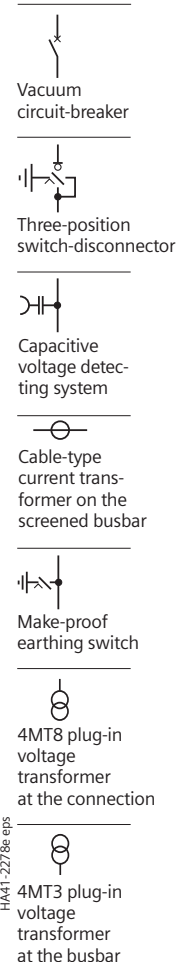


Type SE1 V/SE2
500 mm wide
with plug-in
voltage
transformers

Busbar voltage metering panel



Type MS1V/ME3
500 mm wide



Footnotes from
page 12 and 13

Δ Deep cable
compartment
cover required

$\Delta\Delta$ Short identi-
fications of the
panels have
been harmo-
nized

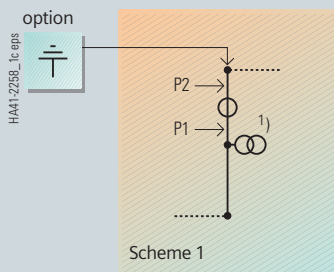
* Depending on
the make/type of
the cable
plug or arrester:
Deep cable
compartment
cover required

** Cable-type
current trans-
former on the
2nd cable:
For 300 mm
deeper cable
compartment

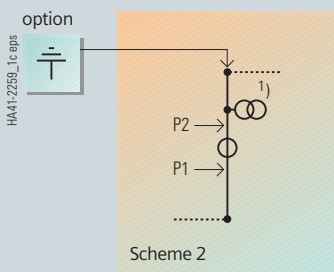
Product Range

Air-insulated metering panels as transfer panels

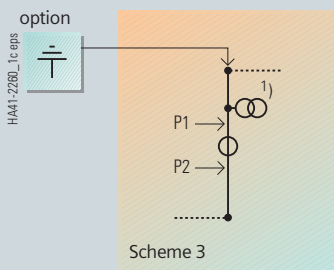
Billing metering panels (standard)



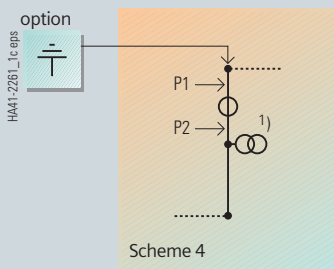
Type ME1, 850 mm wide
for transfer to the right



Type ME1, 850 mm wide
for transfer to the right,
transformer terminals
interchanged



Type ME1, 850 mm wide
for transfer to the right

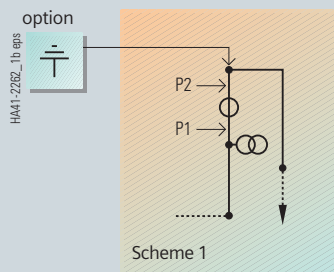


Type ME1, 850 mm wide
for transfer to the right,
transformer terminals
interchanged

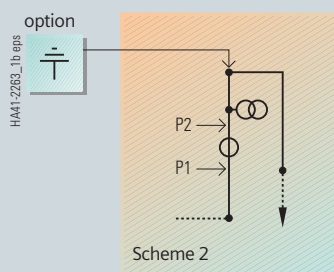
Note

Schemes 1 to 4 also feasible
for transfer to the left

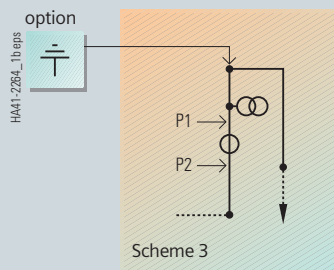
Billing metering panels as end panels, for cable connection



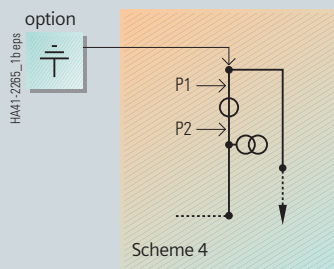
Type ME1-K, 850 mm wide
for transfer to the right



Type ME1-K, 850 mm wide
for transfer to the right,
transformer terminals
interchanged



Type ME1-K, 850 mm wide
for transfer to the right

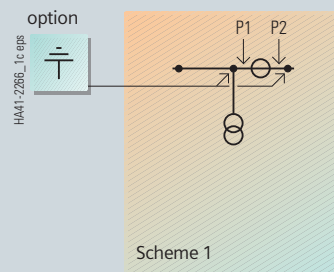


Type ME1-K, 850 mm wide
for transfer to the right,
transformer terminals
interchanged

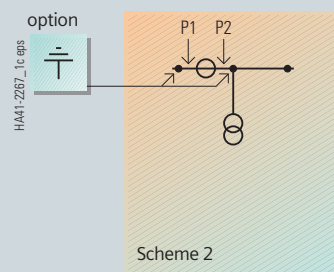
Note

Schemes 1 to 4 also feasible
for transfer to the left

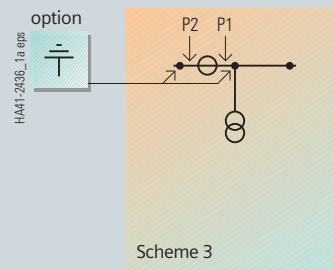
Billing metering panels for busbar connection



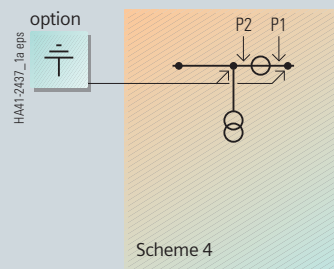
Type ME1-S, 850 mm wide
for busbar metering



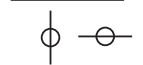
Type ME1-S, 850 mm wide
for busbar metering,
transformer terminals
interchanged



Type ME1-S, 850 mm wide
for busbar metering,
transformer terminals
interchanged



Type ME1-S, 850 mm wide
for busbar metering,
transformer terminals
interchanged



Current trans-
former, cast-resin
insulated



1) Voltage transformer,
cast-resin insulated
or on request:



Voltage transformer,
cast-resin insulated,
with HV HRC fuse



Voltage trans-
former, cast-resin
insulated



Fixed earthing
points for busbar
earthing



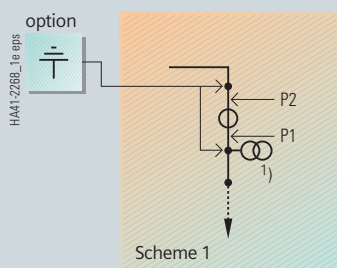
HA41-2278d eps
Cable (not
included in the
scope of supply)

P1 and P2
are terminal
designations
of the current
transformer

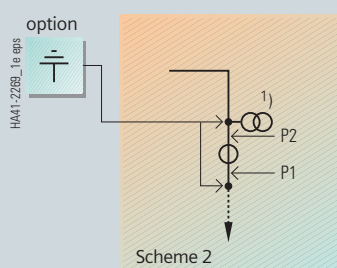
Product Range

Air-insulated metering panels as transfer panels

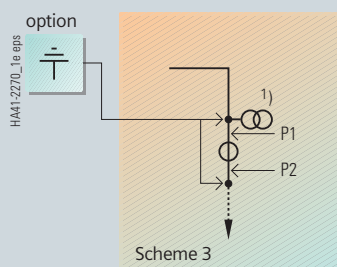
Billing metering panels as end panels, for cable connection



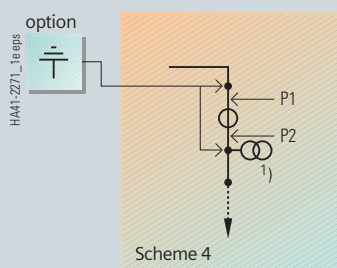
Type ME1-KS, 850 mm wide
for transfer to the right



Type ME1-KS, 850 mm wide
for transfer to the right,
transformer terminals
interchanged



Type ME1-KS, 850 mm wide
for transfer to the right

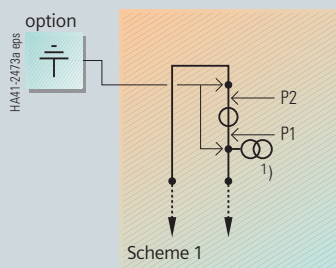


Type ME1-KS, 850 mm wide
for transfer to the right,
transformer terminals
interchanged

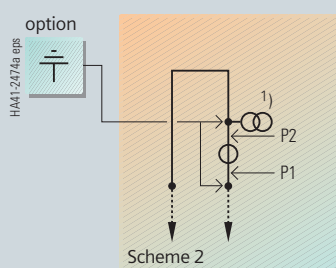
Note

Schemes 1 to 4 also feasible
as left-hand end panel
for transfer to the left

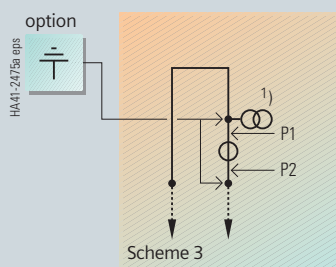
Billing metering panels as individual panels, for cable connection



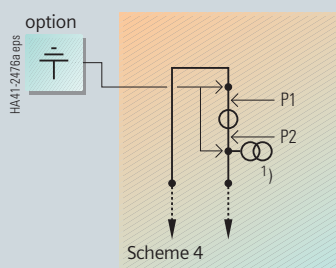
Type ME1-KK, 850 mm wide
for cable connection



Type ME1-KK, 850 mm wide
for cable connection,
transformer terminals
interchanged

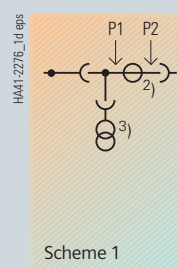


Type ME1-KK, 850 mm wide
for cable connection

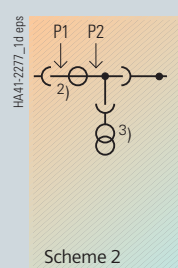


Type ME1-KK, 850 mm wide
for cable connection,
transformer terminals
interchanged

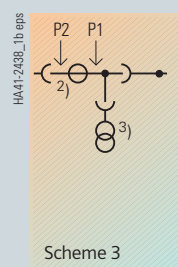
Billing metering panels * with metal-enclosed combined transformers



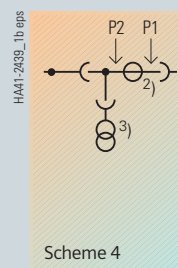
Type ME2, 600 mm wide
for transfer to the right



Type ME2, 600 mm wide
for transfer to the right,
transformer terminals
interchanged

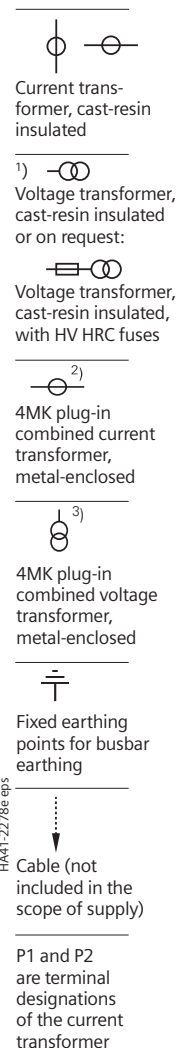


Type ME2, 600 mm wide
for transfer to the left



Type ME2, 600 mm wide
for transfer to the left,
transformer terminals
interchanged

* Mainly for connection to
bus sectionalizer with switch-disconnector
LT1, LT1-V and LT2

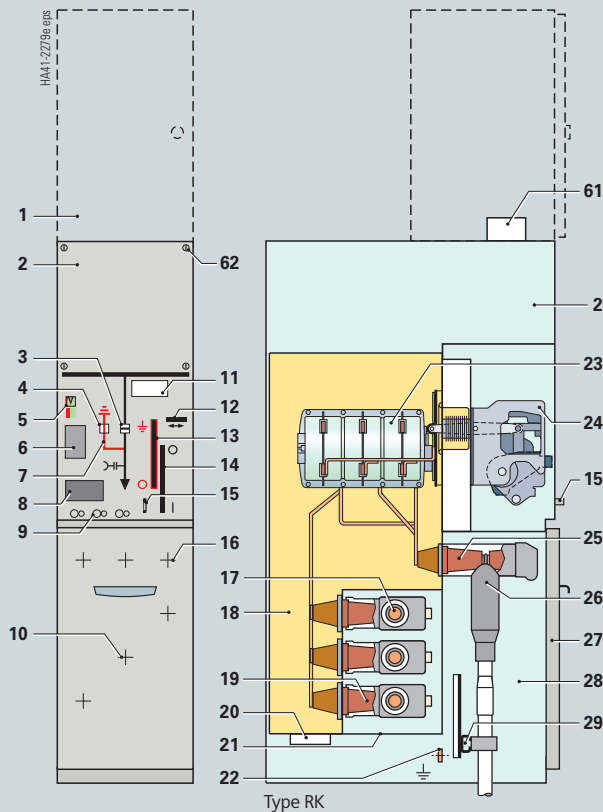


Design

Panel design (examples)

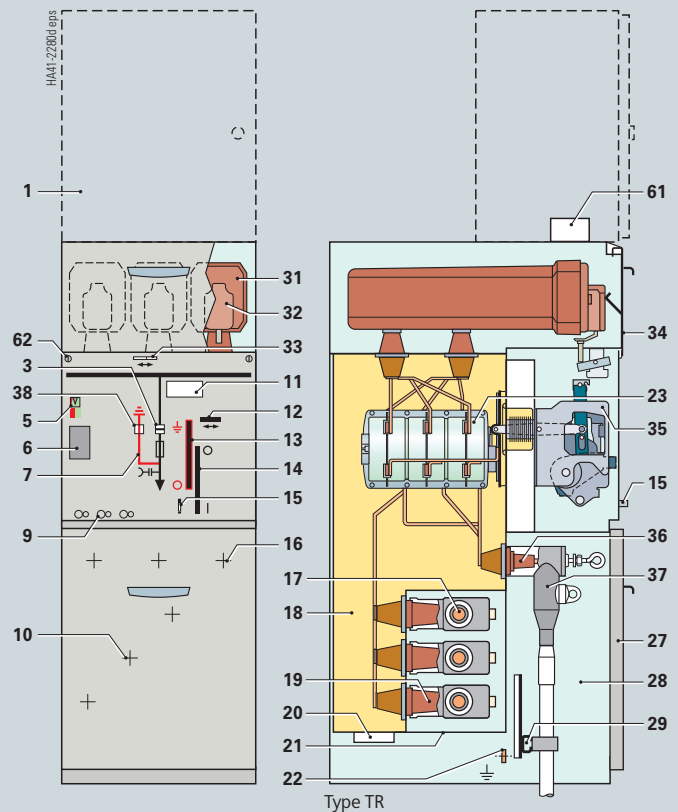
Ring-main panel

Section



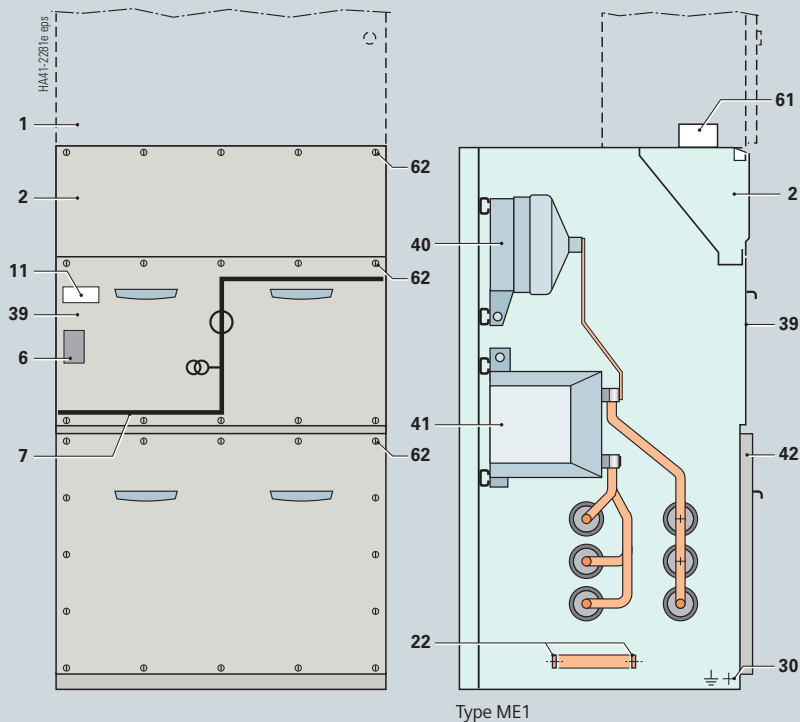
Transformer panel

Section



Billing metering panel, air-insulated

Section

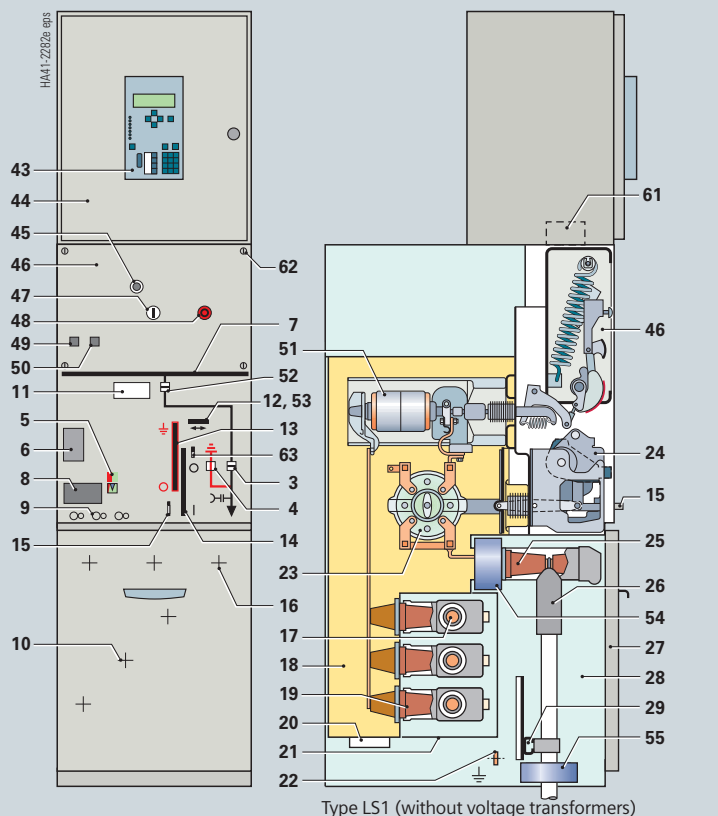


Legend for pages 16 and 17

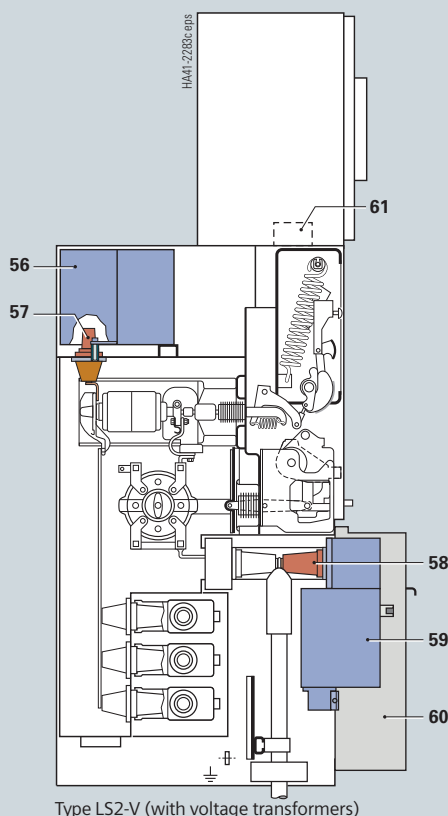
- 1 Option: Low-voltage compartment
- 2 Niche for customer-side low-voltage equipment, with hinged cover
- 3 Switch-position indicator for load-break function "CLOSED – OPEN"
- 4 Switch-position indicator for earthing function "OPEN – EARTHED"
- 5 Ready-for-service indicator
- 6 Rating and type plate
- 7 Mimic diagram
- 8 Option: Short-circuit / earth-fault indicator
- 9 Sockets for voltage detecting system
- 10 Arrangement of the busbars
- 11 Feeder designation label
- 12 Option: Locking device for three-position switch-disconnector
- 13 Manual operation for the mechanism of the earthing function
- 14 Manual operation for the mechanism of the load-break function
- 15 Interlock of the cable compartment cover
- 16 Arrangement of the cable connections
- 17 Busbar system
- 18 Switchgear vessel filled with gas
- 19 Busbar connection
- 20 Pressure relief device

Circuit-breaker panel

Section



Type LS1 (without voltage transformers)



Type LS2-V (with voltage transformers)

- 21 Partition for busbar
- 22 Earthing busbar with earthing connection
- 23 Three-position switch-disconnector
- 24 Spring-operated mechanism
- 25 Bushing for cable plug with bolted contact (M16)
- 26 Option: Cable T-plug
- 27 Cable compartment cover
- 28 Cable compartment
- 29 Cable bracket
- 30 Earthing connection for earthing accessories
- 31 HV HRC fuse assembly, cover removed
- 32 Handle for replacing HV HRC fuse links
- 33 Interlock for HV HRC fuse assembly
- 34 Cover of the HV HRC fuse compartment
- 35 Spring-operated / stored-energy mechanism
- 36 Bushing for cable plug with plug-in contact
- 37 Cable elbow plug with plug-in contact
- 38 Switch-position indicator for load-break function
"CLOSED – OPEN" and, if applicable,
"HV HRC fuse tripped" or "shunt release tripped"
- 39 Cover for access to the busbar connection and to
the instrument transformers, screwed on
- 40 4MR voltage transformer
- 41 4MA7 current transformer
- 42 Cover to busbar connection
compartment, screwed on
- 43 Option: SIPROTEC bay control unit
- 44 Low-voltage compartment (standard)

Vacuum circuit-breaker:

- 45 Opening for the hand crank
– for closing with manual operating mechanism
– for emergency operation with motor operating
mechanism
- 46 Operating mechanism box
- 47 Mechanical "ON" pushbutton (not supplied with
spring-operated mechanism)
- 48 Mechanical "OFF" pushbutton
- 49 Operating cycle counter
- 50 "Spring charged" indicator
- 51 Vacuum interrupter
- 52 Switch-position indicator
- 53 Option: Interlock between vacuum circuit-breaker
and three-position switch-disconnector
- 54 Option: Three-phase current transformer
(protection transformer)
- 55 Cable-type current transformer
- 56 4MT3 plug-in voltage transformer at the busbar
- 57 Bushing for connection of plug-in voltage transformers
- 58 Plug-in connection according to EN 50 181 /
DIN EN 50 181 as interface type "A"
- 59 Option: 4MT8 plug-in voltage transformer at the connection
- 60 Deep cable compartment cover
- 61 Wiring duct, removable, for control cables and/or bus wires
- 62 Cover screwed on
- 63 Option: Interlock between three-position
switch-disconnector and circuit-breaker

Components

3AH vacuum circuit-breaker

Features

- According to IEC 62271/VDE 0671-100 (standards see page 41)
- Application of all 8DH10 switchgear in hermetically sealed vessel in conformity with the system
- Climate-independent vacuum interrupter poles in the gas-filled switchgear vessel
- Maintenance-free for indoor installation according to IEC 62271-1/VDE 0671-1 (standards see page 41)
- Individual secondary equipment
- A metal bellows is used for gasketless separation of the SF₆-insulation and the operating mechanism – as already used with success for over 100,000 vacuum interrupters

Switching duties and operating mechanisms

The switching duties of the vacuum circuit-breaker are dependent, among other factors, on its type of operating mechanism. Three operating mechanism versions are available:

- Motor operating stored-energy mechanism
 - For auto-reclosing (K),
 - For synchronization and rapid load transfer (U)
- Manual operating stored-energy mechanism
 - For auto-reclosing (K)
- Manual spring-operated mechanism (= spring CLOSED, stored-energy OPEN)
 - Not for auto-reclosing (K)
 - For normal closing and
 - For storage of one opening operation

Further operating mechanism features

- Located outside the switchgear vessel in the operating mechanism box and behind the control board
- Stored-energy spring mechanism for 10,000 operating cycles

Abbreviations for switching duties and applications:

U = Synchronization and rapid load transfer (make time ≤ 90 ms)
 K = Auto-reclosing
 O = OPEN operation

CO = CLOSE operation with subsequent OPEN operation at the shortest internal close-open time of the vacuum circuit-breaker
 t = Dead time 0.3 s
 t' = Dead time 3 min

For further technical data and description of typical applications, please refer also to Catalog HG 11.11 "3AH Vacuum Circuit-Breakers"

Operating mechanism functions

Motor operating mechanism ¹⁾ (M1 *)

In the case of the motor operating mechanism, the closing spring is charged by means of a motor and latched in the charged position (the "spring charged" indication is visible). Closing is effected either by means of an ON pushbutton or a closing solenoid. The closing spring is recharged automatically (for auto-reclosing).

Manual operating stored-energy mechanism

The closing spring is charged by means of the hand crank supplied until latching of the closing latch is indicated (= "spring charged" indication).

Subsequently the vacuum circuit-breaker can be closed either manually or electrically and the closing spring can be recharged manually. The "possibility to close" is thus stored once more (for auto-reclosing).

Manual spring-operated mechanism (= spring CLOSED, stored-energy OPEN)

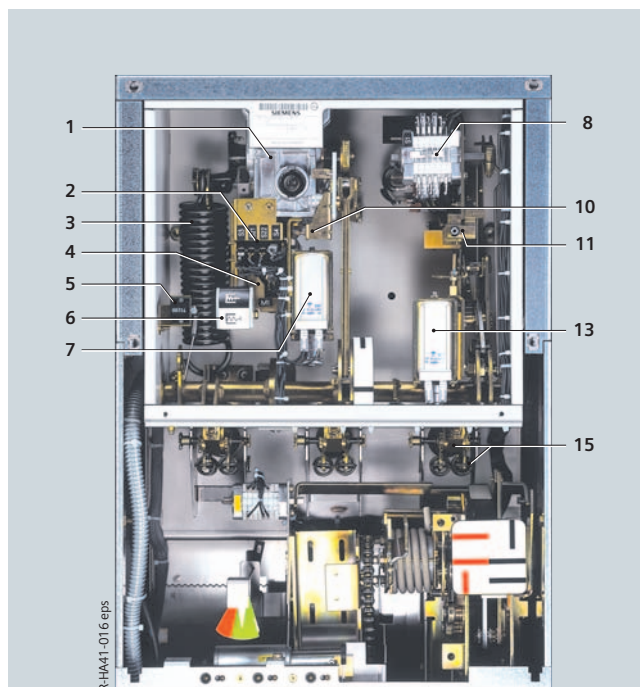
The closing spring of the vacuum circuit-breaker is charged by means of the hand crank supplied until the vacuum circuit-breaker closes. Subsequently either manual or electrical opening is possible.

Vacuum circuit-breakers with spring-operated mechanism are not suitable for auto-reclosing.

Trip-free mechanism

The vacuum circuit-breaker is fitted with a trip-free mechanism.

- 1) Motor rating at 24 V to 220 V DC: 350 W
 110 V and 230 V AC: 400 VA
 2) With closing solenoid
 * Item designation



Operating mechanism of the vacuum circuit-breaker (for the legend, see page 19)

Differentiation features between the vacuum circuit-breakers depending on the operating mechanism version

Operating mechanism version	Motor operating stored-energy mechanism	Manual operating stored-energy mechanism	Manual spring-operated mechanism
Typical uses	Utility substations and industrial plants	Classic transfer substations and substations without auxiliary voltage supply	Simple utility substations (circuit-breaker employed as transformer switch)
Mechanism function	Stored-energy CLOSED, stored-energy OPEN	Stored-energy CLOSED, stored-energy OPEN	Spring CLOSED, stored-energy OPEN
Mechanism operation	With motor ¹⁾ , manual (emergency) operation at the panel including anti-pumping	With hand crank	With hand crank
Closing the vacuum circuit-breaker	Electrically ²⁾ or mechanically at the panel with pushbutton	Mechanically at the panel with push-button, option: electrically ²⁾	Mechanically at the panel with hand crank (charging process)
Closing solenoid, e.g. for remote electrical closing	Always provided, with electrical signal "closing spring charged"	Option	Without
Rated operating sequence	O-t-CO or O-t-CO-t'-CO	O-t-CO	O or CO
Auto-reclosing (K)	Suitable (multiple auto-reclosing possible)	Suitable (only with closing solenoid)	–

The scope of the 3AH vacuum circuit-breaker secondary equipment depends on the type of application and offers a wide range of options, thus allowing even the highest requirements to be satisfied.

Closing solenoid

- Type 3AY15 10 (Y9 *)
- For electrical closing

Shunt releases

- Types:
 - Standard: 3AY15 10 (Y1 *)
 - Option: 3AX11 01 (Y2 *), with energy store
- Tripping by protection device or electrical operation

Current-transformer operated release

- Type 3AX11 04 (Y6 *) for tripping pulse ≥ 0.1 Ws in conjunction with suitable protection systems, e.g. 7SJ4 protection system, 4MC6.. transformer protection system, SEG relay (other designs on request)
- Used where no external auxiliary voltage is available, tripping by protection device

Undervoltage release

- Type 3AX11 03 (Y7 *)
- Comprising:
 - Energy store and unlatching mechanism
 - Electromagnetic system which is permanently connected to voltage while the vacuum circuit-breaker is closed; tripping is initiated when this voltage drops
- Connection to voltage transformers possible

Anti-pumping (standard) (mechanical and electrical)

- Function: If constant CLOSE and OPEN commands are present at the vacuum circuit-breaker at the same time, the vacuum circuit-breaker will return to the open position after closing. It remains in this position until a new CLOSE command is given. In this manner, continuous closing and opening (= pumping) is avoided.

Circuit-breaker tripping signal (standard)

- For electrical signalling (as pulse > 10 ms), e.g. to remote control systems, in the case of automatic tripping (e.g. protection)
- Via limit switch (S6 *) and cut-out switch (S7 *)

Varistor module

- To limit overvoltages to approx. 500 V for protection devices (when inductive devices are mounted in the vacuum circuit-breaker)
- For auxiliary voltages ≥ 60 V DC

Auxiliary switch

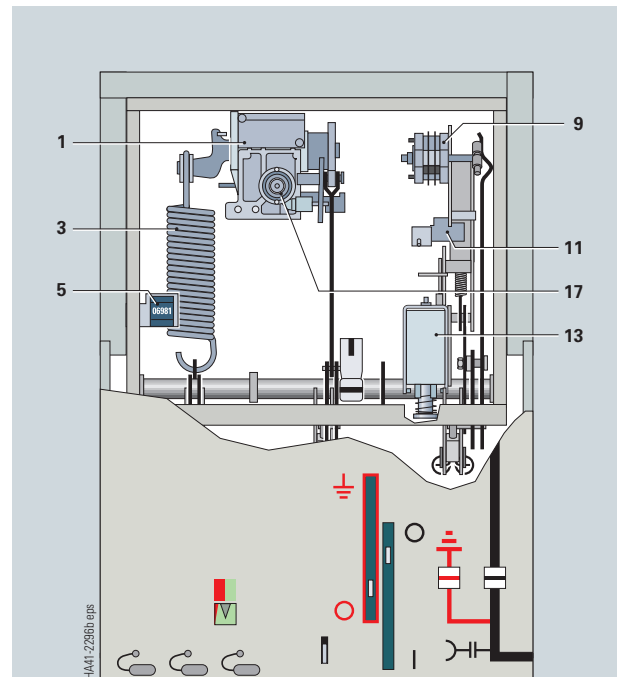
- Type 3SV9 (S1 *)
- Standard: 6 NO+6 NC, of which 2 NO+2 NC+2 changeover contacts are free ¹⁾
- Option: 12 NO+12 NC, of which 7 NO+4 NC+2 changeover contacts are free ¹⁾

Position switch

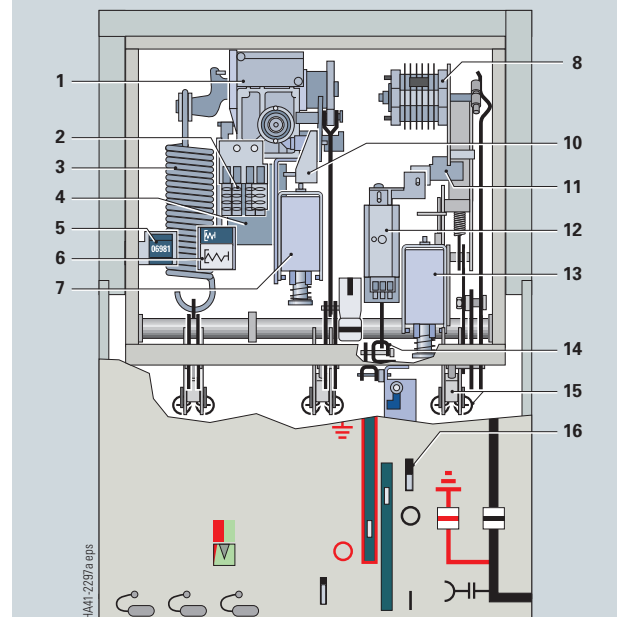
- Type 3SE4 (S4 *)
- For signalling "closing spring charged"
- Only in conjunction with stored-energy mechanisms

Mechanical interlocking

- Dependent on the type of operating mechanism
- Option: Switchgear interlocking with the three-position switch-disconnector (option: Closing lock-out for the three-position switch-disconnector in circuit-breaker panels type LS and LT1)
- Option: Operating mechanism with mechanical interlocking as
 - Spring-operated mechanism: Hand crank opening is blocked
 - Stored-energy mechanism with closing solenoid (Y9 *) and pushbutton (S12 *): The pushbutton (S12 *) operated by the mechanical interlock prevents a continuous command to the closing solenoid
- During operation of the three-position switch-disconnector from CLOSED to OPEN: Vacuum circuit-breaker cannot be closed.



Basic equipment with manual spring-operated mechanism



Maximum equipment with motor operating stored-energy mechanism

Secondary equipment (view into the operating mechanism box)

- | | |
|--|---|
| 1 Gear | 11 Circuit-breaker "OPEN" |
| 2 Position switch (S4 *) | 12 Option: 2 nd release |
| 3 Closing spring | 13 1 st release (Y1 *) |
| 4 Motor (M1 *) | 14 Option: Mechanical interlocking with interrogation of the three-position switch-disconnector |
| 5 Operating cycle counter | 15 Operating rod with contact pressure springs |
| 6 "Closing spring charged" indicator | 16 Interlocking to the three-position switch-disconnector |
| 7 Closing solenoid (Y9 *) | 17 Actuation for closing the vacuum circuit-breaker |
| 8 Option: Auxiliary switch 12 NO+12 NC | |
| 9 Auxiliary switch 6 NO+6 NC (S1 *) | |
| 10 Circuit-breaker "CLOSED" | |

1) For utilization by the customer	* Item designation	Abbreviations: NO = normally-open contact NC = normally-closed contact
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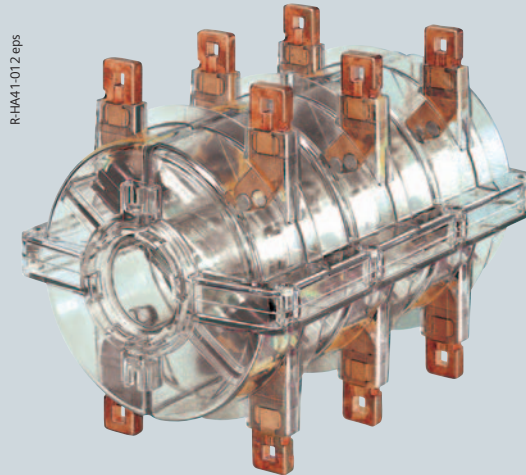
For further technical data and description of typical applications, please refer also to Catalog HG 11.11 "3AH Vacuum Circuit-Breakers"

Components

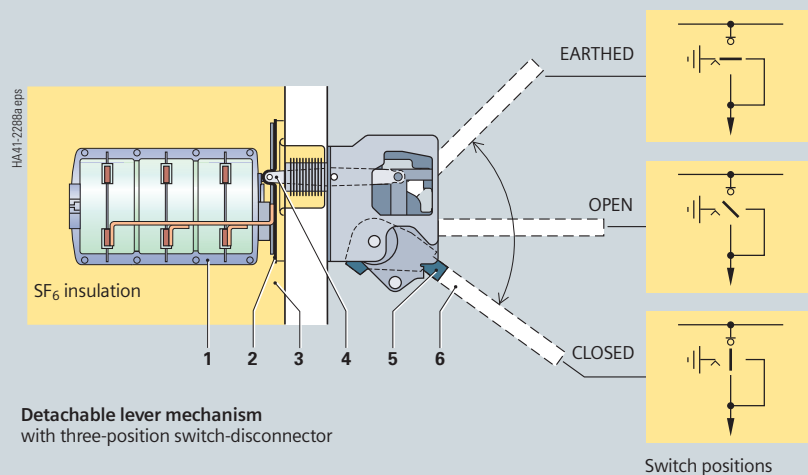
Three-position switch-disconnector

Features

- Switch positions: CLOSED – OPEN – EARTHED
- Switching functions as general-purpose switch-disconnector (class E3) according to
 - IEC 60265-1/VDE 0670-301
 - IEC 62271-102/VDE 0671-102 (standards see page 41)
- Designed as a multi-chamber switch with the functions
 - Switch-disconnector and
 - Make-proof earthing switch
- Operation via gas-tight welded-in metal bellows at the front of the switchgear vessel



Three-position switch-disconnector



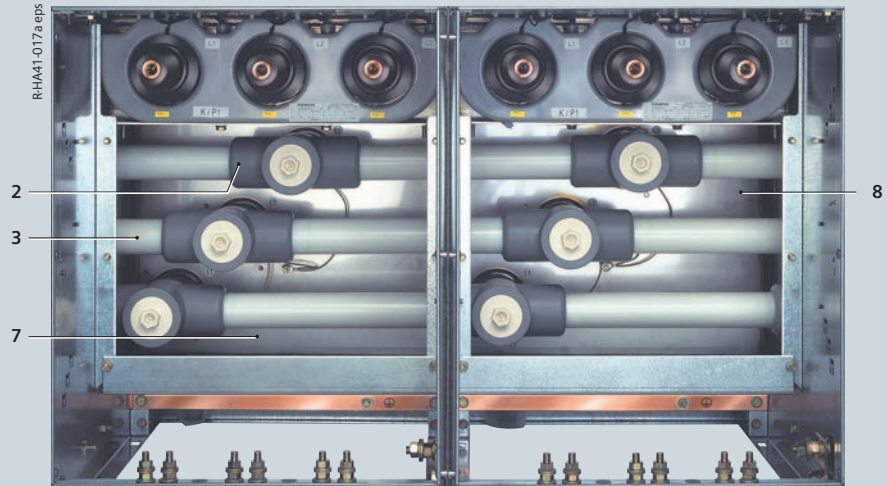
Detachable lever mechanism
with three-position switch-disconnector

- 1 Three-position switch-disconnector
- 2 Coupling linkage
- 3 Switchgear vessel
- 4 Operating mechanism rocker
- 5 Detachable lever mechanism
- 6 Operating lever inserted

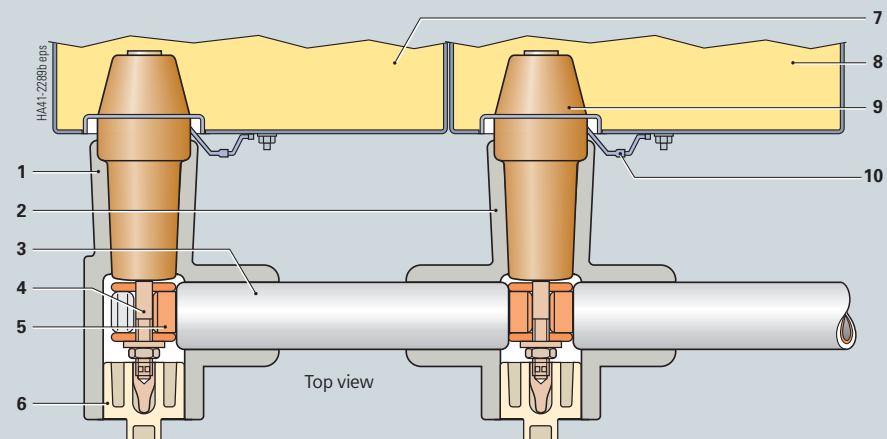
For further details, please refer to
Catalog HA 40.1 "Switchgear
Types 8DJ and 8DH for Secondary
Distribution Systems up to 24 kV,
Gas-Insulated (General Part)"

Features

- Safe-to-touch as a result of use of metal covers
- Plug-in type
- Consisting of round-bar copper, insulated by means of silicone rubber
- Busbar joints with cross and end adapters, insulated by means of silicone rubber
- Insensitive to pollution and condensation
- Switchgear extension or panel replacement is possible without gas work
- Special busbar connections to metering panels type ME1 are possible. Connection to the
 - Cable connection bushings of the adjacent panel
 - or to the
 - Busbar bushings
- Busbar arrangement in panel blocks within the switchgear vessel filled with gas
 - Option screened busbar:
 - Field control by means of electrically conductive layers on the silicone-rubber insulation
 - Installation of 4MC70 32 current transformers is thus possible
 - Independent of the site altitude
- Option: Capacitive voltage detecting system for the busbar, refer also to the product range, pages 10 to 15



Busbar compartments over 2 panels
with busbar connections, busbar covers removed



Insulated plug-in type busbar
unscreened design

Busbar system

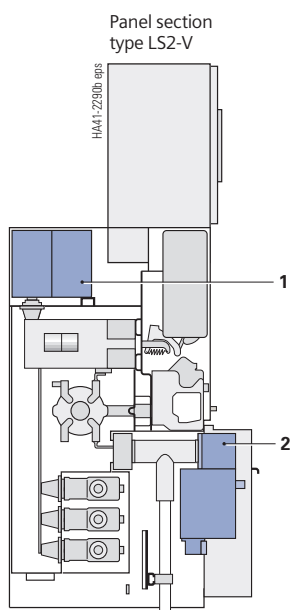
- 1 End adapter
- 2 Cross adapter
- 3 Busbar insulation of silicone rubber
- 4 Threaded bolt M12 / M16
- 5 Busbar, Cu, diameter 32 mm
- 6 Stopper

Switchgear vessel

- 7 Primary enclosure panel 1
- 8 Primary enclosure panel 2
- 9 Bushing
- 10 Capacitive tap at the bushings, earthed (standard)

Components

4MT3 * and 4MT8 * plug-in voltage transformers for panel types LS, TR, SE and ME3



- 1 4MT3 * for the busbar
- 2 4MT8 * at the cable connection

Common features

- According to IEC 60044-2/ VDE 0414-2
- Designed as single-pole voltage transformers, plug-in type
- Inductive type
- Climate-independent
- Secondary connection by means of plugs inside the panel
- Connection with plug-in contact
- Installation behind metallic cover

Features type 4MT3

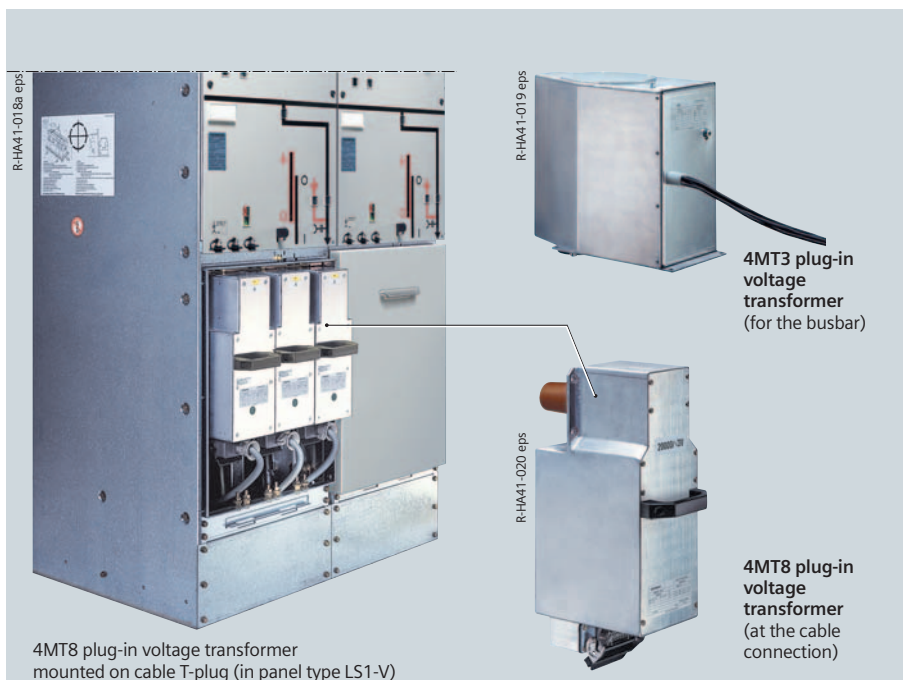
- Inside-cone system, metal-coated

Features type 4MT8

- Outside-cone system, metal-enclosed
- For deep cable compartment cover

Installation

- Safe-to-touch arrangement due to metallic cover
- Arrangement on the switchgear vessel for busbar metering:
 - 4MT3 voltage transformer for panel types LS1 V/LS2, SE1 V/SE2, MS1 V/ME3 and LKV/LT1
- Arrangement at the cable connection:
 - 4MT8 voltage transformer, pluggable on screened cable T-plug, for panel types LS1-V, LS2-V and TR-V (deep cable compartment cover required)
 - 4MT8 voltage transformer, directly pluggable via adapter on the bushing with plug-in contact (interface type "A"), for panel type TR/V (deep cable compartment cover required)



4MT8 plug-in voltage transformer mounted on cable T-plug (in panel type LS1-V)

Technical data

4MT3 * and 4MT8 * voltage transformers

Primary data

Max. equipment operating voltage $U_m (= 1.2 \times U_N)$	12 kV
Rated voltage U_N at max. rated short-duration power-frequency withstand voltage U_d	3.3/√3 kV at 10 kV 3.6/√3 kV at 20 kV 4.8/√3 kV at 20 kV 5.0/√3 kV at 20 kV 6.0/√3 kV at 20 kV 6.6/√3 kV at 20 kV 7.2/√3 kV at 28 kV 10.0/√3 kV at 28 kV 11.0/√3 kV at 28 kV
Rated lightning impulse withstand voltage U_p	3.6 kV / 20 kV 7.2 kV / 60 kV 12 kV / 75 kV
Rated voltage factor (8 h)	$1.9 \times U_N$
Max. equipment operating voltage $U_m (= 1.2 \times U_N)$	24 kV
Rated voltage U_N at max. rated short-duration power-frequency withstand voltage U_d	13.8/√3 kV at 38 kV 15.0/√3 kV at 38 kV 17.5/√3 kV at 50 kV 20.0/√3 kV at 50 kV 22.0/√3 kV at 50 kV
Rated lightning impulse withstand voltage U_p	17.5 kV / 95 kV 24 kV / 125 kV
Rated voltage factor (8 h)	$1.9 \times U_N$

Secondary data for 4MT3 voltage transformers

Rated voltage	100/√3 V 110/√3 V (option)
Rated voltage for auxiliary winding (option)	100/3 V 110/3 V (option)
Rated thermal limit current (measuring winding)	6 A
Rated long-time thermal current (8 h)	4 A
Rating VA	25 15 60 100 150
Class	0.2 0.5 0.5 1 1

Secondary data for 4MT8 voltage transformers

Rated voltage	100/√3 V 110/√3 V (option)
Rated voltage for auxiliary winding (option)	100/3 V 110/3 V (option)
Rated thermal limit current (measuring winding)	4 A
Rated long-time thermal current (8 h)	4 A
Rating VA	15 15 30 30 100
Class	0.2 0.5 0.5 1 3

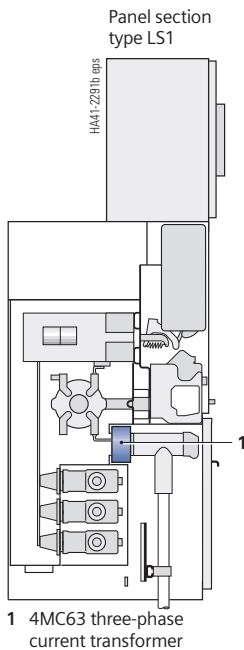
Combination of 4MT8 * voltage transformers with cable T-plugs (screened, without metal housing)

Make	Type	Combination	Make	Type	Combination
Euromold	(K) 400 TB/G (K) 440 TB, AGT 10/20	yes	Südkabel	SEHDT (13/23)	yes
nkt cables	on request	yes	Südkabel	SET (12/24)	on request
Prysmian Kabel und Systeme	FMCTs-400, FMCTg-400	yes	Cooper	DT 400 P	yes
			Tyco Electronics	RSTI-L56xx for: • 35-300 mm ² (M12) • > 300 mm ² (M16)	on request (add. measures) on request

* Disassembly is necessary in order to perform voltage tests on the switchgear on site (max. 80 % U_d)

Components

4MC63 three-phase current transformer for panel type LS



Features

- According to IEC 60044-1/ VDE 0414-1
- Designed as three-pole ring-core current transformer
- Free of dielectrically stressed cast-resin parts (due to design)
- Insulation class E
- Inductive type
- Climate-independent
- Secondary connection by means of a terminal strip inside the panel

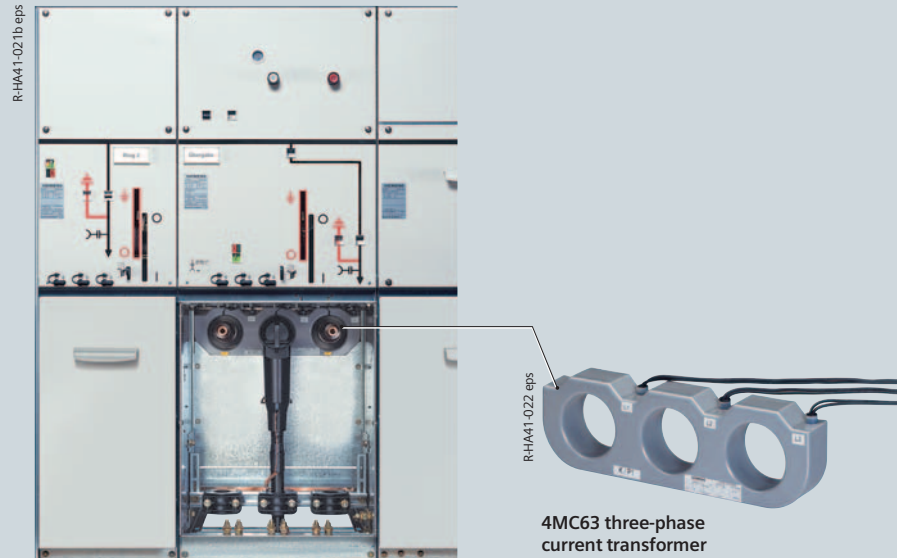
Installation

- Arranged outside the switch-gear vessel on the bushings of the cable connection
- Mounted at the factory

Other designs (option)

Three-phase current transformer for protection equipment based on the current transformer operation principle:

- 7SJ4x protection system as definite-time overcurrent protection
- Definite-time overcurrent protection relay make SEG, type WIP 1 or type WIC



4MC63 three-phase current transformer on the bushings of the cable connection

Technical data

4MC63 10 three-phase current transformer for $I_N \leq 150$ A and $I_D = 630$ A

Primary data

Max. equipment operating voltage U_m	0.72 kV
Rated current I_N	A 150 100 75 50
Rated short-duration power-frequency withstand voltage (winding test)	3 kV
Rated thermal short-time withstand current I_{th}	25 kA
Rated continuous thermal current I_D	630 A
Transient overload current	$1.5 \times I_D / 1$ h
Rated peak withstand current I_{dyn}	unlimited

Secondary data

Rated current	A	1	0.67	0.5	0.33
Rating	VA	2.5	1.7	1.25	0.8
Rated current (option)		5 A			
Current at I_D		4.2 A			
Protection class		10 P			
Overcurrent factor		10			

Other values on request

4MC63 11 three-phase current transformer for $I_N \leq 400$ A and $I_D = 630$ A

Primary data

Max. equipment operating voltage U_m	0.72 kV
Rated current I_N	A 400 300 200
Rated short-duration power-frequency withstand voltage (winding test)	3 kV
Rated thermal short-time withstand current I_{th}	25 kA
Rated continuous thermal current I_D	630 A
Transient overload current	$2 \times I_D / 0.5$ h
Rated peak withstand current I_{dyn}	unlimited

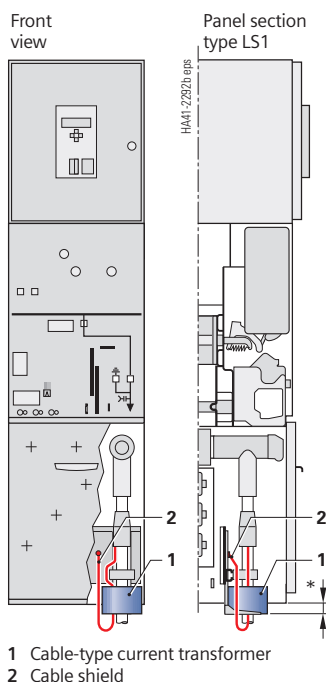
Secondary data

Rated current	A	1	0.75	0.5
Rating	VA	4	3	2
Rated current (option)		5 A		
Current at I_D		1.575 A		
Protection class		10 P		
Overcurrent factor		10		

Other values on request

Components

4MC70 33 and 4MC70 31 cable-type current transformers for panel types LS, RK and TR



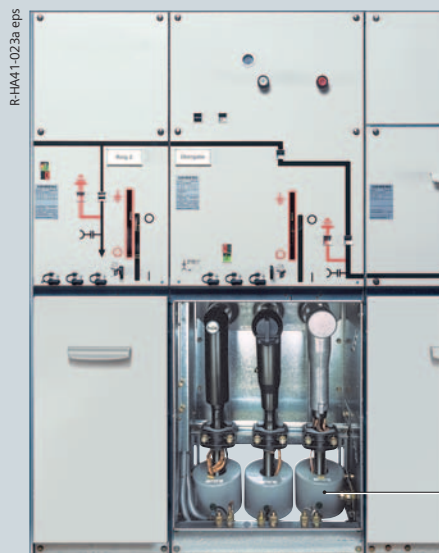
Features

- According to IEC 60044-1/ VDE 0414-1
- Designed as single-pole ring-core current transformers
- Free of dielectrically stressed cast-resin parts (due to design)
- Insulation class E
- Inductive type
- Climate-independent
- Secondary connection by means of a terminal strip inside the panel
- Only for shielded cables

Installation

- 4MC70 33 cable-type current transformer for panel type LS
- 4MC70 31 cable-type current transformer for panel types RK and TR
- Arranged outside the switchgear vessel around the cable at the panel connection
- Transformers mounted on a supporting plate at the factory; final assembly around the cables on site
- For double cable: 300 mm deeper cable compartment cover

* Max. 230 mm, depending on the core data of the 4MC70 33 cable-type current transformer, overall heights 170 and 285 mm (observe floor openings on page 36)



4MC70 33 cable-type current transformer for the cables at the panel connection

Technical data

4MC70 33 cable-type current transformer

Primary data	
Max. equipment operating voltage U_m	0.72 kV
Rated current I_N	30 A to 600 A
Rated short-duration power-frequency withstand voltage (winding test)	3 kV
Rated thermal short-time withstand current I_{th}	25 kA
Rated continuous thermal current I_D	$1.0 \times I_N$ option: $1.2 \times I_N$
Transient overload current	$1.5 \times I_D / 1 \text{ h}$ or $2 \times I_D / 0.5 \text{ h}$
Rated peak withstand current I_{dyn}	unlimited

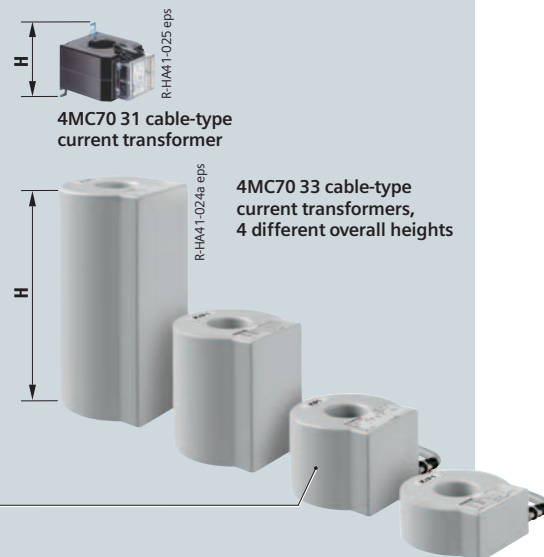
Secondary data

Rated current	1 A (option: 5 A)
Measuring core	Class 0.2 0.5 1
Overcurrent factor	FS10 (option: FS5)
Rating	2.5 VA to 10 VA
Protection core	Class 10 P 5 P
Overcurrent factor	10 10
Rating	2.5 VA to 10 VA
Option: Secondary tap	1 : 2 (e.g. 150 A – 300 A)

Dimensions

Overall height H, dependent on the core data	mm	50	100	170	285
Outside diameter		145 mm			
Inside diameter		55 mm			
For cable diameter		50 mm			

Other values on request



4MC70 31 cable-type current transformer

Primary data	
Max. equipment operating voltage U_m	0.72 kV
Rated current I_N	50 A to 600 A
Rated short-duration power-frequency withstand voltage (winding test)	3 kV
Rated thermal short-time withstand current I_{th}	25 kA
Rated continuous thermal current I_D	$1.0 \times I_N$ option: $1.2 \times I_N$
Transient overload current	$1.5 \times I_D / 1 \text{ h}$ or $2 \times I_D / 0.5 \text{ h}$
Rated peak withstand current I_{dyn}	unlimited

Secondary data

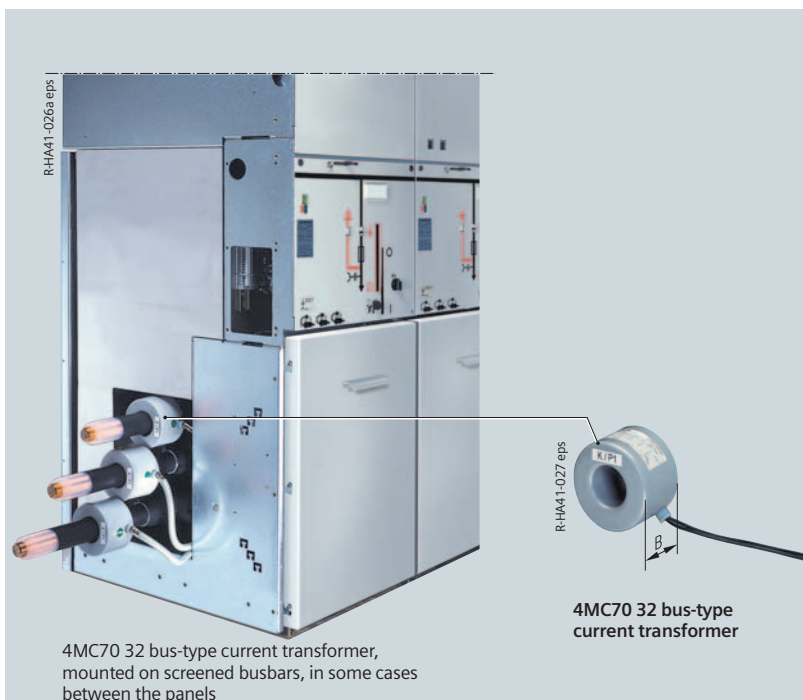
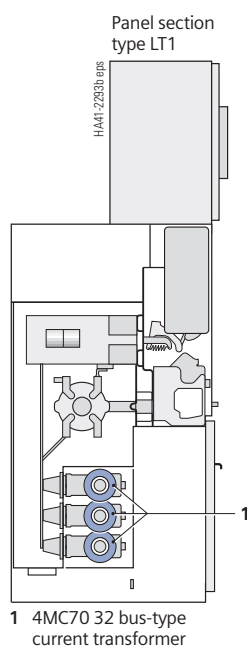
Rated current	1 A (option: 5 A)
Measuring core	Class 1
Overcurrent factor	FS5 (option: FS10)
Rating	2.5 VA to 10 VA
Option: Secondary tap	1 : 2

Dimensions

Overall height H	89 mm
Width x depth	85 mm x 114 mm
Inside diameter	40 mm
For cable diameter	36 mm

Other values on request

4MC70 32 bus-type current transformers for panel type LT (for screened busbars only)



Features

- Used exclusively for screened busbars
- Preferably in combination with panel type ME2
- According to IEC 60044-1/ VDE 0414-1
- Designed as single-pole ring-core current transformers
- Free of dielectrically stressed cast-resin parts (due to design)
- Insulation class E
- Inductive type
- Climate-independent
- Secondary connection by means of a terminal strip inside the panel

Installation

- Arranged outside the switchgear vessel only on the screened busbars
- Installation of the bus-type current transformers either between the panels or alternatively
- Supplied loosely (including the busbar connections), if the mounting position of the bus-type current transformers lies at the joint of a transport unit

Technical data

4MC70 32 bus-type current transformer

Primary data

Max. equipment operating voltage U_m	0.72 kV
Rated current I_N	200 A to 600 A
Rated short-duration power-frequency withstand voltage (winding test)	3 kV
Rated thermal short-time withstand current I_{th}	25 kA
Rated continuous thermal current I_D	1.0 x I_N option: 1.2 x I_N
Transient overload current	1.5 x I_D / 1 h or 2 x I_D / 0.5 h
Rated peak withstand current I_{dyn}	unlimited

Secondary data

Rated current	1 A (option: 5 A)
Measuring core	Class 0.2 0.5 1
Overcurrent factor	FS10 (option: FS5)
Rating	2.5 VA to 10 VA
Protection core	Class 10 P 5 P *
Overcurrent factor	10 10
Rating	2.5 VA to 15 VA
Option: Secondary tap	1 : 2 (e.g. 150 A – 300 A)

Dimensions

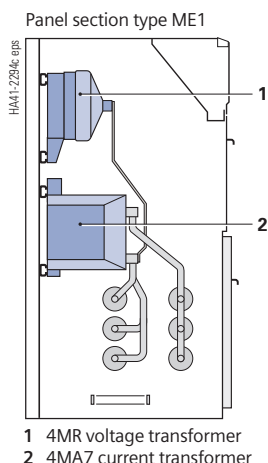
Overall width B, dependent on the core data	80 mm 150 mm
Outside diameter	125 mm
Inside diameter	55 mm

Other values on request

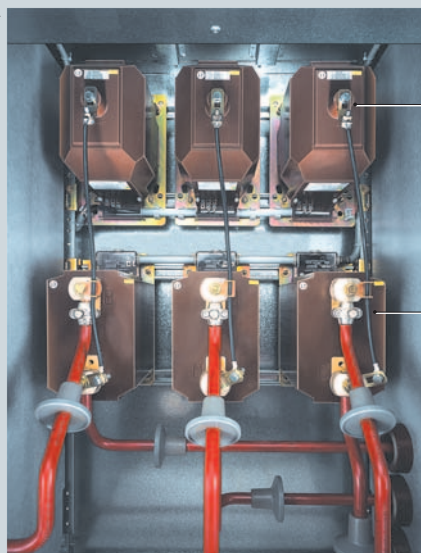
* On request

Components

4MA7 current transformers and 4MR voltage transformers for air-insulated billing metering panels type ME1

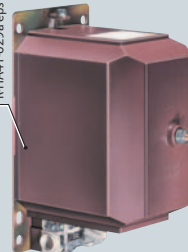


R-HA41-028 eps



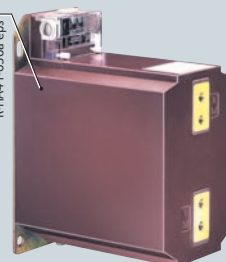
4MR voltage transformers and 4MA7 current transformers installed in billing metering panel type ME1

R-HA41-029a eps



4MR14 voltage transformer

R-HA41-030a eps



4MA7 current transformer

Features

4MA7 current transformer

- According to IEC 60044-1/ VDE 0414-1
- Dimensions according to DIN 42 600-8 (small design)
- Designed as single-pole indoor block-type current transformers
- Cast-resin insulated
- Insulation class E
- Secondary connection by means of screw-type terminals

4MR voltage transformer

- According to IEC 60044-2/ VDE 0414-2
- Dimensions according to DIN 42 600-9 (small design)
- Designed as indoor voltage transformers:
 - Type 4MR, single-pole
 - Option: Type 4MR, two-pole
- Cast-resin insulated
- Insulation class E
- Secondary connection by means of screw-type terminals

Technical data

4MA7 single-pole current transformer

Primary data		
Max. equipment operating voltage U_m	12/ 17.5 kV	24 kV
Rated short-duration power-frequency withstand voltage U_d	28/ 38 kV	50 kV
Rated lightning impulse withstand voltage U_p	75/ 95 kV	125 kV
Rated current I_N	25 A to 600 A	
Rated thermal short-time withstand current I_{th}	up to 25 kA	
Rated continuous thermal current I_D	1.0 x I_N option: 1.2 x I_N	
Rated peak withstand current I_{dyn}	max. 2.5 x I_{th}	

Secondary data

Rated current		1 A or 5 A		
Measuring core	Class	0.2	0.5	1
	Overcurrent factor	FS5 or FS10		
	Rating	10 VA to 15 VA		
Protection core	Class	5 P or 10 P		
	Overcurrent factor	10		
	Rating	5 VA to 15 VA		

Other values on request

4MR single-pole voltage transformer

Primary data	
Max. equipment operating voltage $U_m (= 1.2 \times U_N)$	12 kV
Rated voltage U_N at max. rated short-duration power-frequency withstand voltage U_d	3.3/√3 kV at 10 kV
	3.6/√3 kV at 20 kV
	4.8/√3 kV at 20 kV
	5.0/√3 kV at 20 kV
	6.0/√3 kV at 20 kV
	6.6/√3 kV at 20 kV
Rated lightning impulse withstand voltage U_p	7.2/√3 kV at 28 kV
	10.0/√3 kV at 28 kV
	11.0/√3 kV at 28 kV
	3.6 kV / 20 kV
Rated voltage factor (8 h)	7.2 kV / 60 kV
	12 kV / 75 kV
	1.9 x U_N
Max. equipment operating voltage $U_m (= 1.2 \times U_N)$	24 kV
Rated voltage U_N at max. rated short-duration power-frequency withstand voltage U_d	13.8/√3 kV at 38 kV
	15.0/√3 kV at 38 kV
	17.5/√3 kV at 50 kV
	20.0/√3 kV at 50 kV
Rated lightning impulse withstand voltage U_p	22.0/√3 kV at 50 kV
	17.5 kV / 95 kV
Rated voltage factor (8 h)	24 kV / 125 kV
	1.9 x U_N

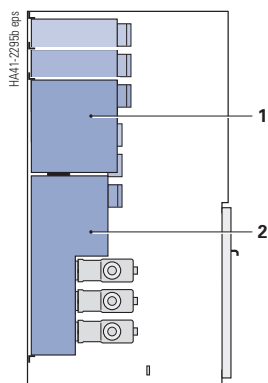
Secondary data

Rated voltage	100/√3 V
	110/√3 V (option)
	120/√3 V (option)
Rated voltage for auxiliary winding (option)	100/3 V
	110/3 V (option)
	120/3 V (option)
Rating	20 VA 50 VA 100 VA
Class	0.2 0.5 1

Other values on request

4MK * metal-enclosed combined transformers for billing metering panels type ME2

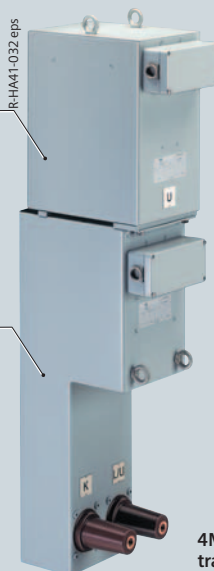
Panel section type ME2



- 1 4MK3 combined voltage transformer
- 2 4MK1 combined current transformer



4MK combined transformers installed in billing metering panel type ME2



- 1 4MK3 combined voltage transformer
- 2 4MK1 combined current transformer

4MK combined transformer

Features

- 4MK * combined transformer, comprising
 - 4MK1 combined current transformer
 - 4MK3 combined voltage transformer
- According to IEC 60044-3/ VDE 0414-5
- Designed as indoor transformers, single-pole combination
- Metal-enclosed
- Insulation class E
- Inductive type
- Secondary connection by means of screw-type terminals

Panel type ME2

- For combination with left-hand panels
 - As individual panels or
 - As panel blocks (on request)
- For combination with right-hand panels as end panels or panel blocks

Technical data

4MK1 combined current transformer

Primary data		
Max. equipment operating voltage U_m	12 kV	24 kV
Rated short-duration power-frequency withstand voltage U_d	28 kV	50 kV
Rated lightning impulse withstand voltage U_p	75 kV	125 kV
Rated current I_N	50 A to 600 A	
Rated thermal short-time withstand current I_{th}	up to 25 kA	
Rated continuous thermal current I_D	1.0 $\times I_N$ option: 1.2 $\times I_N$	
Rated peak withstand current I_{dyn}	max. 2.5 $\times I_{th}$	

Secondary data

Rated current		1 A or 5 A
Measuring core	Class	0.2 0.5 1
	Overcurrent factor	FS5 or FS10
	Rating	10 VA to 15 VA
Protection core	Class	10 P
	Overcurrent factor	10
	Rating	5 VA or 15 VA
Secondary multiratio		option

Other values on request

4MK3 combined voltage transformer

Primary data	
Max. equipment operating voltage $U_m (= 1.2 \times U_N)$	12 kV
Rated voltage U_N at max. rated short-duration power-frequency withstand voltage U_d	3.3/√3 kV at 10 kV
	3.6/√3 kV at 20 kV
	4.8/√3 kV at 20 kV
	5.0/√3 kV at 20 kV
	6.0/√3 kV at 20 kV
	6.6/√3 kV at 20 kV
Rated lightning impulse withstand voltage U_p	7.2/√3 kV at 28 kV
	10.0/√3 kV at 28 kV
	11.0/√3 kV at 28 kV
	3.6 kV / 20 kV
Rated lightning impulse withstand voltage U_p	7.2 kV / 60 kV
	12 kV / 75 kV
	1.9 $\times U_N$
Rated voltage factor (8 h)	
Max. equipment operating voltage $U_m (= 1.2 \times U_N)$	24 kV
Rated voltage U_N at max. rated short-duration power-frequency withstand voltage U_d	13.8/√3 kV at 38 kV
	15.0/√3 kV at 38 kV
	17.5/√3 kV at 50 kV
	20.0/√3 kV at 50 kV
	22.0/√3 kV at 50 kV
	17.5 kV / 95 kV
Rated lightning impulse withstand voltage U_p	24 kV / 125 kV
	1.9 $\times U_N$
	1.9 $\times U_N$

Secondary data

Rated voltage	100/√3 V
	110/√3 V (option)
Rated voltage for auxiliary winding (option)	100/3 V
	110/3 V (option)
Rating	30 VA 75 VA 150 VA
Class	0.2 0.5 1

Other values on request

* Available only as a combination of current and voltage transformers

Components

Cable connection

Features

- Bushings with outside cone
- Uniform cable connection height 575 mm
- With cable bracket, e.g. type C40 according to DIN EN 50 024
- Access to the cable compartment only if the feeder has been isolated and earthed

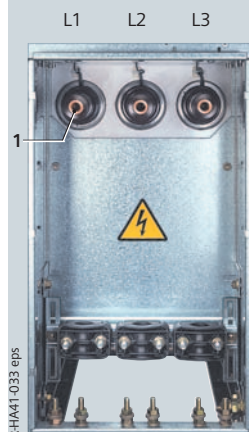
Special features

- In ring-main panels
- In circuit-breaker panels
- In cable panels:
- With bolted contact (M16) as interface type "C" according to EN 50181/ DIN EN 50181
- For thermoplastic-insulated cables
- For paper-insulated mass-impregnated cables with adapter systems
- For conventional cable sealing ends via elbow adapter AKE 20/630 (make Siemens)
- For cable T-plugs or cable elbow plugs with bolted contact (M16)
- For connection cross-sections up to 300 mm² (standard)
- Cable routing downwards, cable connection at front
- For rated normal currents of 400/630 A
- In transformer panels:
- With plug-in contact as interface type "A" according to EN 50 181/ DIN EN 50 181
- For cable elbow plugs with plug-in contact
- For thermoplastic-insulated cables
- For connection cross-sections up to 120 mm²
- For rated normal currents of 200 A

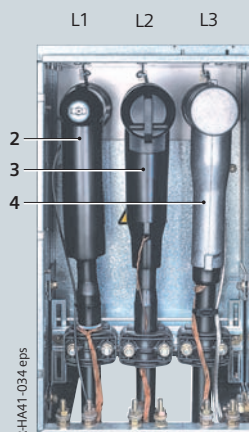
Options

See figures on the right

Cable connection · Examples



Cable compartment, as-delivered condition *

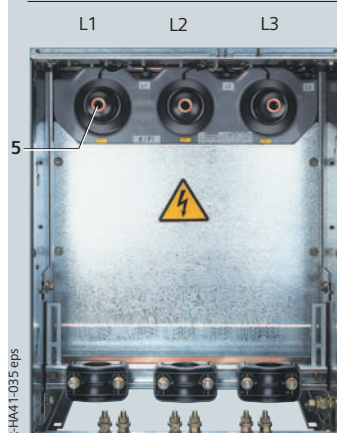


Cable plugs with bolted contact (M16)

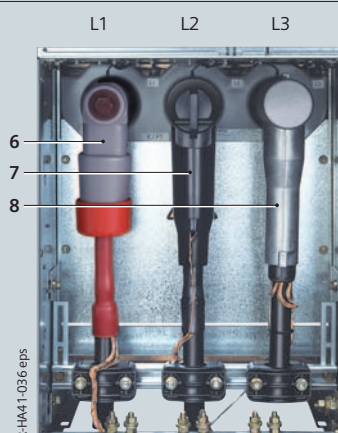
Cable connections in ring-main panels

- 1 Prepared for cable plugs with bolted contact (M16)
- 2 Phase L1: Make Euromold, type K400 LB as cable elbow plug
- 3 Phase L2: Make Euromold, type K400 TB as cable T-plug
- 4 Phase L3: Make Euromold, type AGT 20/630 as cable T-plug

For options A, B, C and E, see below



Cable compartment, as-delivered condition *

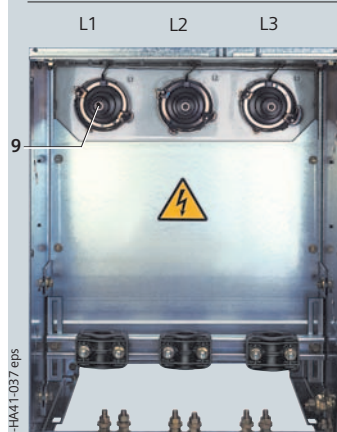


Cable plugs with bolted contact (M16)

Cable connections in circuit-breaker panels

- 5 Prepared for cable plugs with bolted contact (M16)
- 6 Phase L1: Elbow adapter, make Siemens, type AKE 20/630
- 7 Phase L2: Make Euromold, type K400 TB as cable T-plug
- 8 Phase L3: Make Euromold, type AGT 20/630 as cable T-plug

For options A, B, C, E and F, see below



Cable compartment, as-delivered condition *



Cable elbow plugs with plug-in contact

Cable connections in transformer panels

- 9 Prepared for cable elbow plugs with plug-in contact
- 10 Phase L1: Make Euromold, type AWGL
- 11 Phase L2: Make Euromold, type K158 LR
- 12 Phase L3: Make Euromold, type AGW 20/250 (with metal housing)

For options A, D and F, see below

Options

- A Mounted cable clamps
- B Short-circuit / earth-fault indicator
- C Double cable connection with corresponding cable plugs and deep cable compartment cover

- D Bushings as interface type "C" according to EN 50 181 / DIN EN 50 181 for cable plugs with bolted contact (M16)
- E Suitable for connection of plug-in surge arresters in conjunction with corresponding cable T-plugs
- F Suitable for connection of 4MT8 metal-enclosed voltage transformers in conjunction with corresponding cable T-plugs; deep cable compartment cover is required

* Cable plugs, cable sealing ends and cable clamps are not included in the scope of supply

Components

Low-voltage equipment

Low-voltage compartment *

- Overall height
 - Standard 600 mm
 - Option 900 mm
- Partitioned safe-to-touch from the high-voltage part of the panel
- Installation on the panel:
 - Standard for circuit-breaker panel type LS and bus section-alizer with switch-disconnector type LT1
 - Option for all other panel types, depending on the scope of the secondary equipment
- For accommodation of protection, control, measuring and metering equipment, e. g. suitable for multifunction protection device SIPROTEC 4 7SJ63
- Electronic control board of the multifunction protection device SIPROTEC 4 7SJ63 with the following features:

- 1 User-programmable LEDs with application-specific label, for displaying any desired process and equipment data
- 2 LCD for process and equipment data, e.g. for
 - Measuring and metering values
 - Binary information on status of switchgear and switching device
 - Protection data
 - General indications
 - Alarms
- 3 Keys for navigation in the menus and for entering values
- 4 Four user-programmable function keys for frequently performed actions

Low-voltage niche

- Only inside billing metering panels type ME1
- Option: For accommodation, e.g. of voltage transformer, m.c.b.s

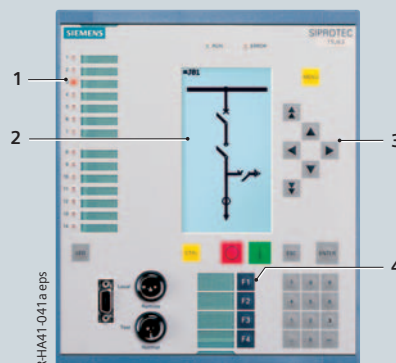
Low-voltage cables

- Control cables of the panel to the low-voltage compartment are connected via multi-pole, coded module plug connectors
- Option: Plug-in bus wires from panel to panel are routed in the separate wiring duct on the panel

Low-voltage compartment

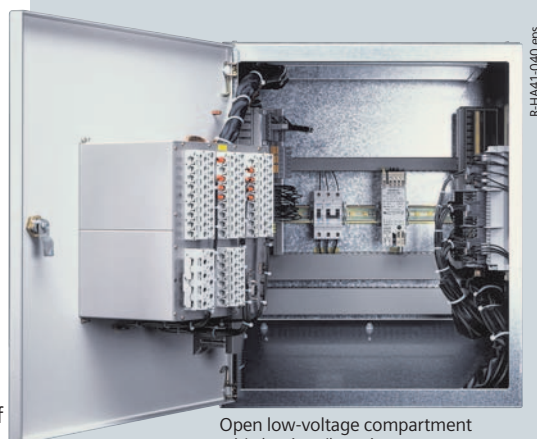


Low-voltage compartment of a circuit-breaker panel type LS



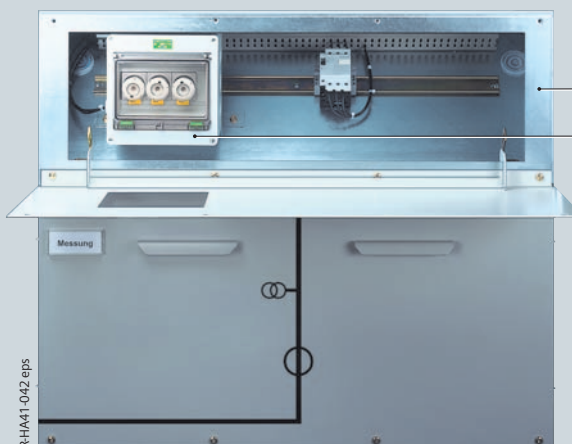
Electronic control board with multifunction protection device SIPROTEC 4 7SJ63

- 1 LEDs
- 2 LCD
- 3 Navigation keys
- 4 Function keys



Open low-voltage compartment with (optional) equipment

Low-voltage niche



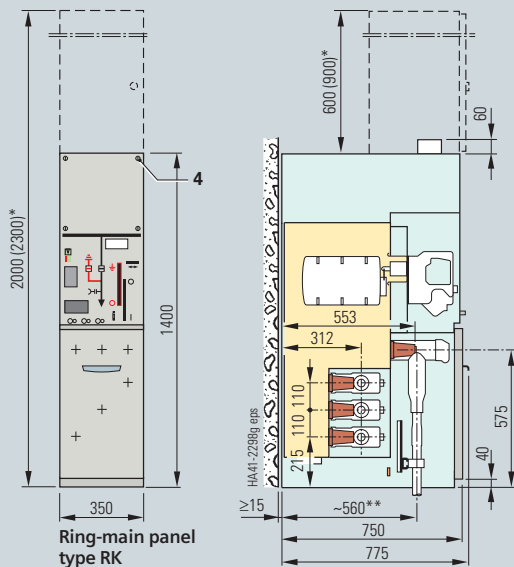
- 1 Low-voltage niche
- 2 Equipment (option)

Low-voltage niche of a billing metering panel type ME1 with open cover

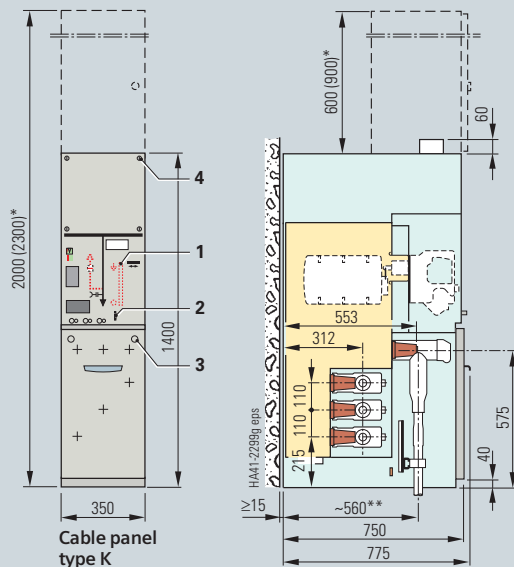
* Door hinge on the left (standard)

Dimensions

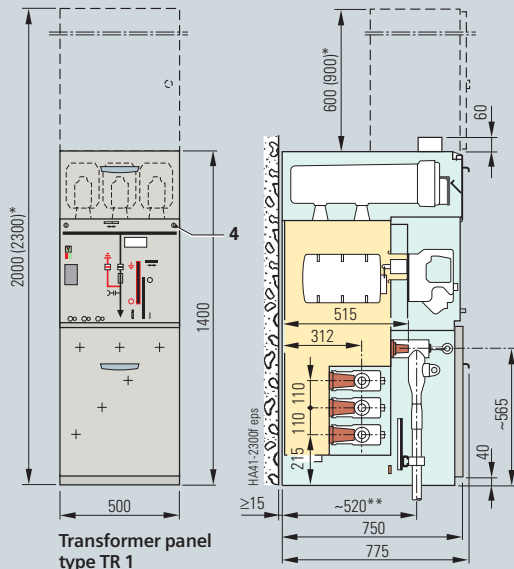
Ring-main, cable, transformer and circuit-breaker panels as individual panels



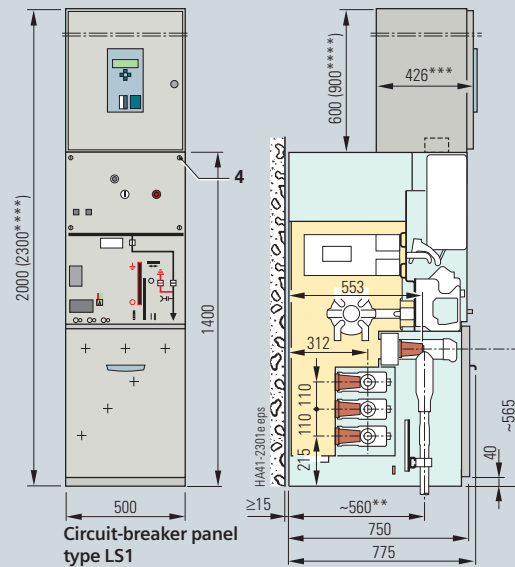
Ring-main panel
type RK



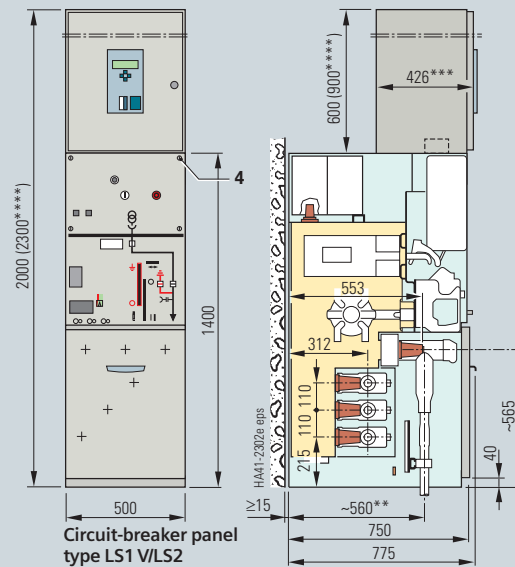
Cable panel
type K



Transformer panel
type TR 1



Circuit-breaker panel
type LS1



Circuit-breaker panel
type LS1 VLS2

Cable panel type K:

- 1 Option: Earthing function
- 2 Interlock of cable compartment cover if earthing function is available
- 3 Cable compartment cover screwed on (without earthing function)
- 4 Cover screwed on

* Option:
With low-voltage compartment

** Dependent on the type of
cable plug

*** Available mounting depth
for low-voltage equipment

**** Option: With high
low-voltage compartment 900 mm

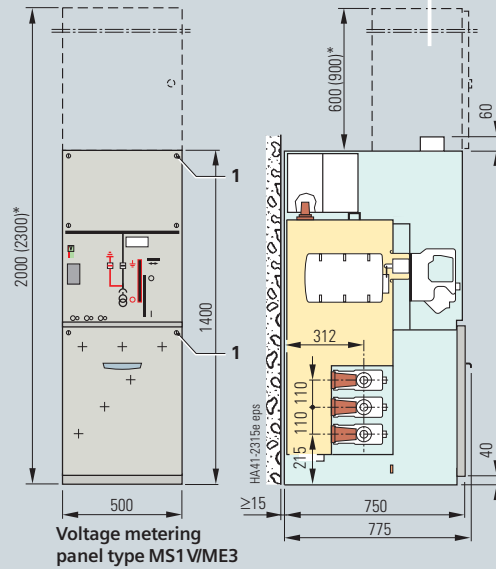
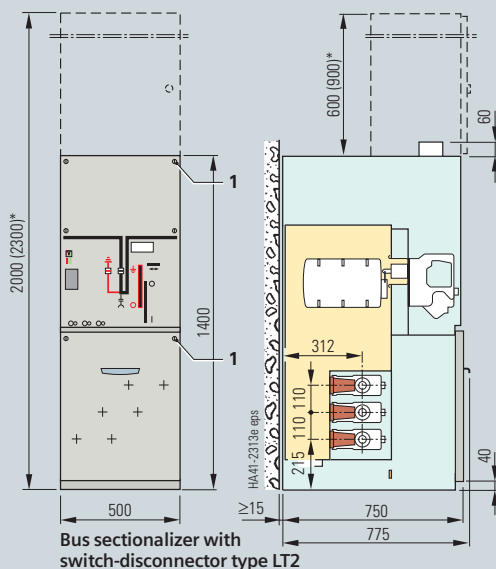
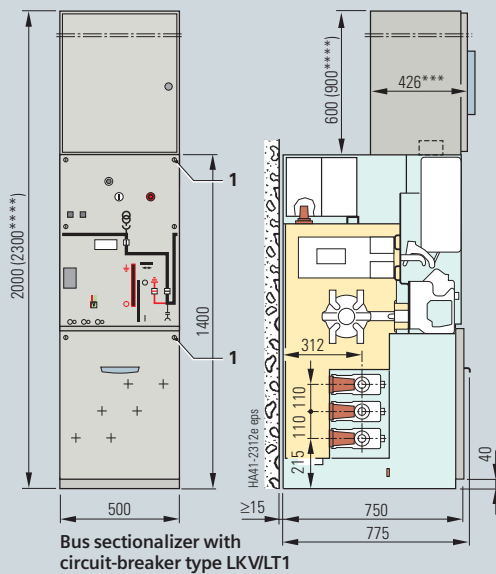
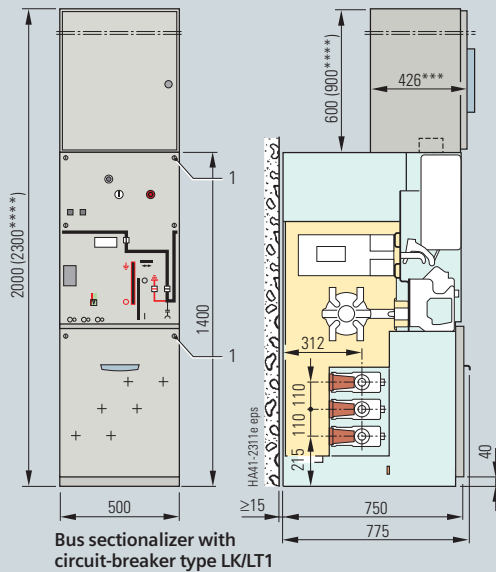
Dimensions

Ring-main, cable and transformer panels in panel blocks



Dimensions

Bus sectionalizers with circuit-breakers, bus sectionalizers with switch-disconnectors and busbar voltage metering panel as individual panels



1 Cover screwed on

* Option: With low-voltage compartment

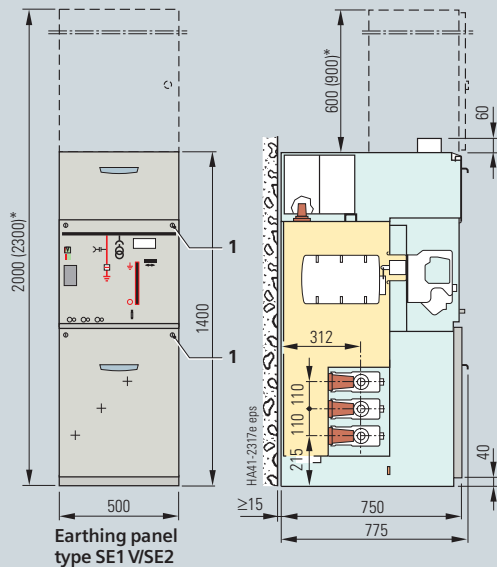
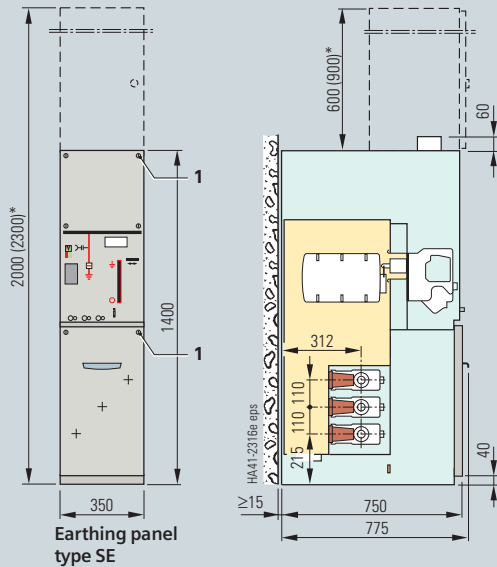
*** Available mounting depth for low-voltage equipment

**** Option: With high low-voltage compartment 900 mm

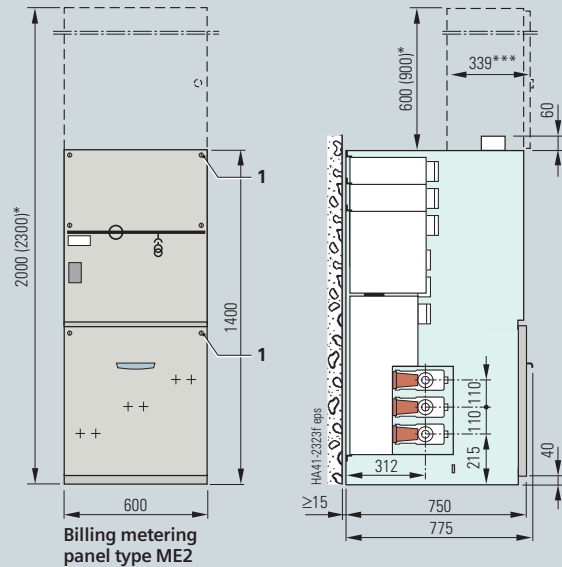
Dimensions

Busbar earthing panels as individual panels

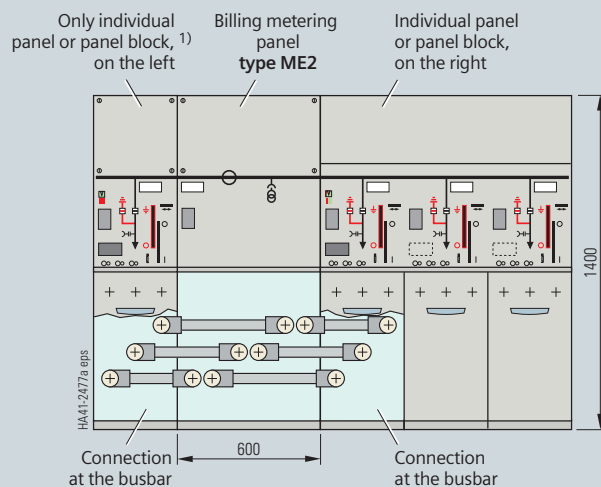
Billing metering panel ME2 as individual panel and metering panel combin. with billing metering panel



* Option:
With low-voltage compartment



Metering panel combination



Billing metering panel type ME2 with individual panel attached on the left and panel block attached on the right (example)

1 Cover screwed on

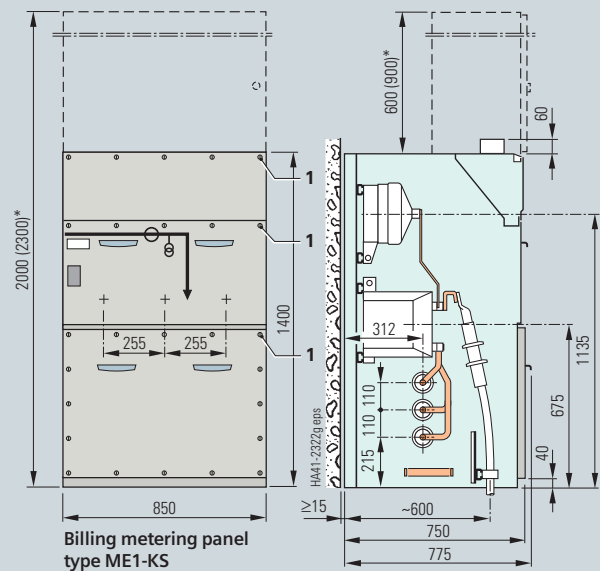
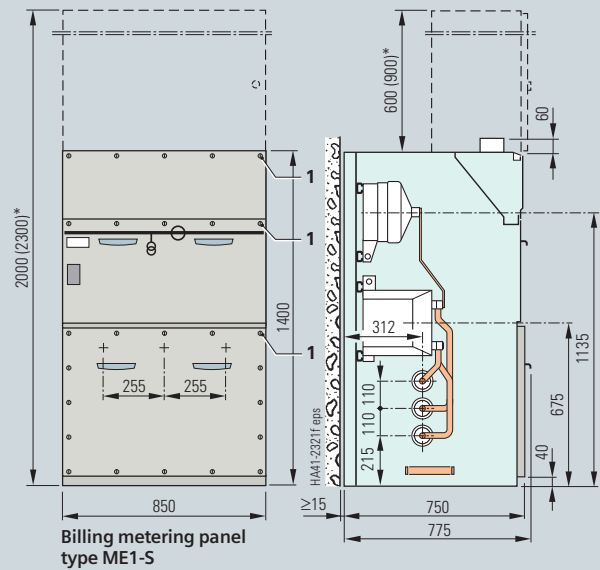
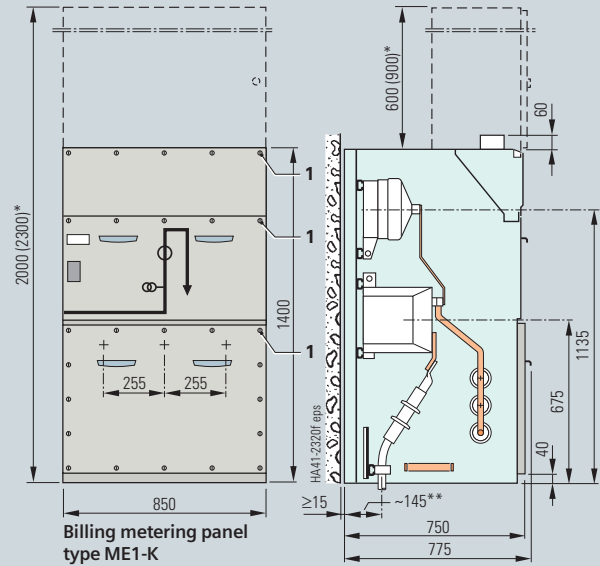
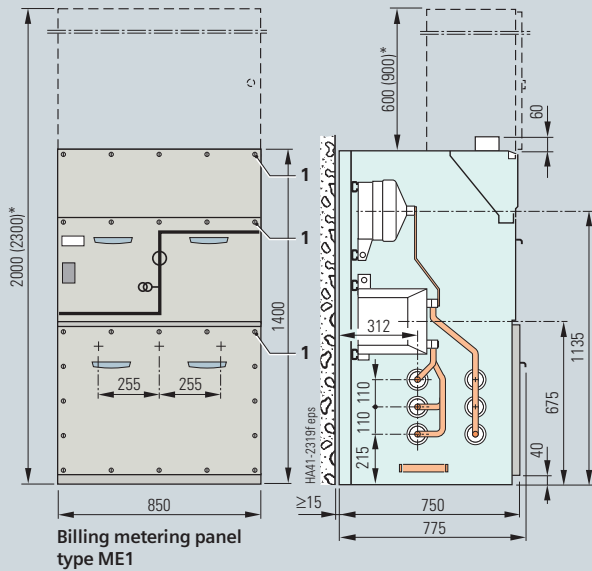
* Option:
With low-voltage compartment

*** Available mounting depth for low-voltage equipment

1) Panel block on request

Dimensions

Billing metering panels type ME1... as individual panels



1 Cover/cable compartment cover screwed on

* Option:
With low-voltage compartment

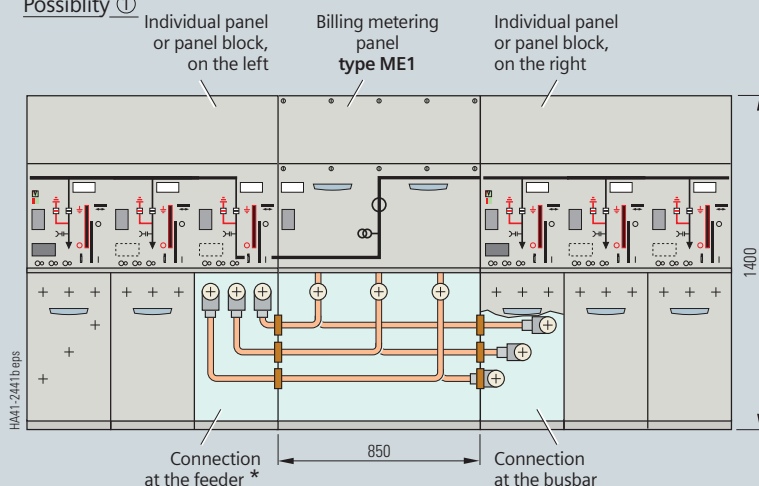
** Dimension for cable routing: 323 mm for combination of panel type ME1-K with pressure absorber duct

Dimensions

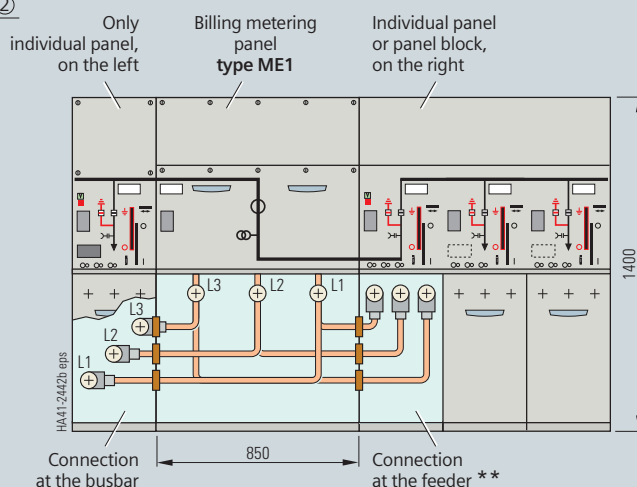
Metering panel combinations with billing metering panels type ME1...

Billing metering panels with individual panels or panel blocks attached on the left and right (examples)

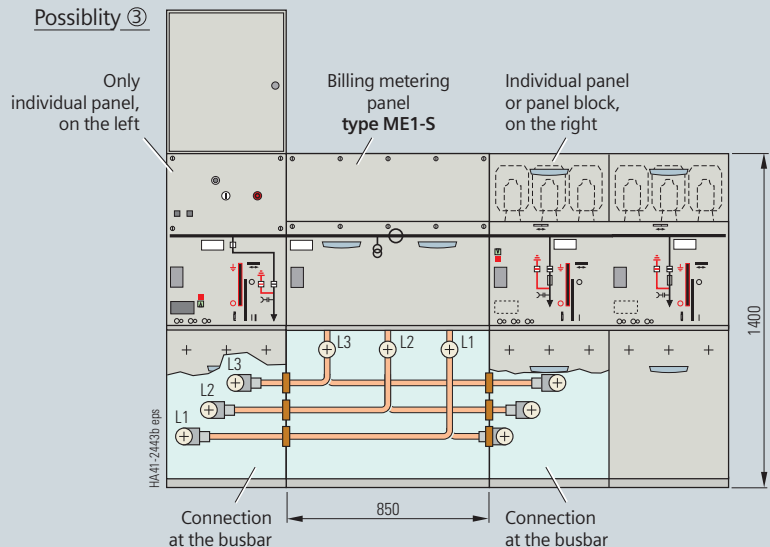
Possibility ①



Possibility ②



Possibility ③



Possible panel arrangements

The following types of individual panels or panel blocks can be attached to billing metering panels – on the right or left:

Possibility ①

- Types attached on the left with connection at the feeder
 - Individual panel type RK-U, K-U, TR-U, LS1-U or LS2-U
 - Panel block type R-B2 or R-B3 (in RK-U panel), T-B2 or T-B3 (in TR-U panel), RT-B2, 2RT-B3 or 3RT-B4 (in TR-U panel) or KT-B2 (in TR-U panel)
- Types attached on the right with connection at the busbar
 - Individual panel type RK, K, TR, LS1, LS2, SE1, SE2, ME3 or LT
 - Panel block type R-B2, R-B3, T-B2, T-B3, RT-B2, 2RT-B3, 3RT-B4 or KT-B2

Possibility ②

- Types attached on the left with connection at the busbar
 - Individual panel type RK, K, TR, LS1, LS2, SE1, SE2, ME3 or LT
 - Panel blocks cannot be attached
- Types attached on the right with connection at the feeder
 - Individual panel type RK-U, K-U, TR-U, LS1-U or LS2-U
 - Panel block type R-B2 or R-B3 (in RK-U panel), T-B2 or T-B3 (in TR-U panel), RT-B2, 2RT-B3 or 3RT-B4 (in RK-U panel) or KT-B2 (in K-U panel)

Possibility ③

- Types attached on the left with connection at the busbar
 - Individual panel type RK, K, TR, LS1, LS2, SE1, SE2, ME3 or LT
 - Panel blocks cannot be attached
- Types attached on the right with connection at the busbar
 - Individual panel type RK, K, TR, LS1, LS2, SE1, SE2, ME3 or LT
 - Panel block type R-B2, R-B3, T-B2, T-B3, RT-B2, 2RT-B3, 3RT-B4 or KT-B2

Connection inside the panel block:

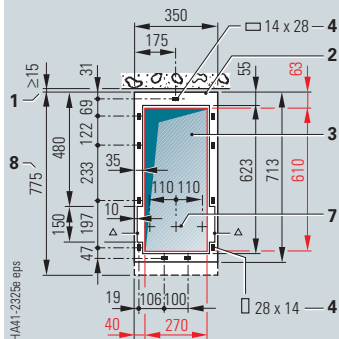
* Only possible in the right-hand feeder

** Only possible in the left-hand feeder

Dimensions

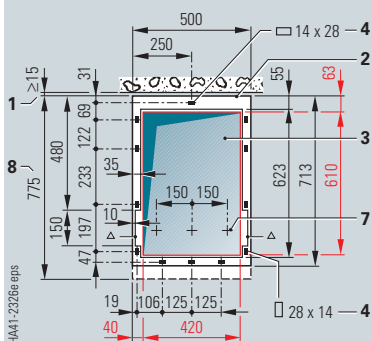
Floor openings (dimensions in red) and fixing points

Standard (for special versions, see pages 38 and 39)



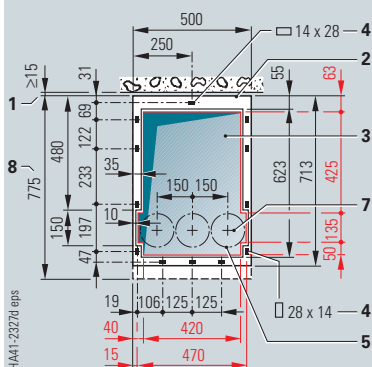
For individual panels

- For ring-main panels type RK
- For cable panels type K
- For busbar earthing panel type SE



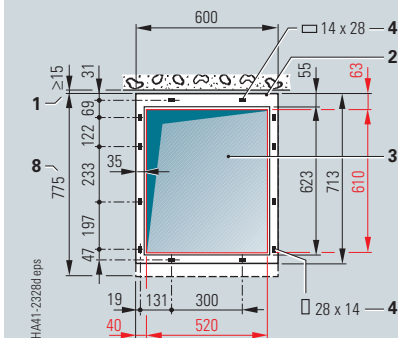
For individual panels

- For circuit-breaker panel types LS1 and LS2 for ring-main panels type RK1 each without cable-type current transformers
- For transformer panels type TR1
- For bus sectionalizer with circuit-breaker type LK and bus sectionalizer with switch-disconnector type LT
- For busbar earthing panel type SE2
- For busbar voltage metering panel type ME3



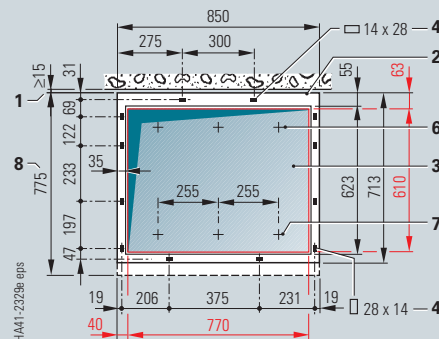
For individual panels

- For circuit-breaker panel types LS1 and LS2 each with cable-type current transformers



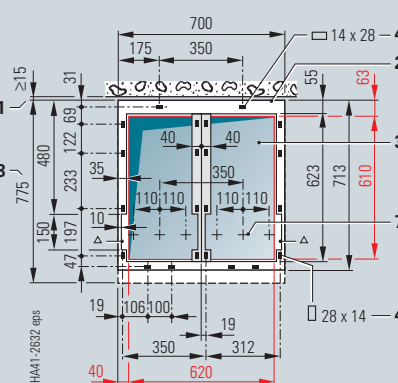
For individual panels

- For billing metering panels type ME2



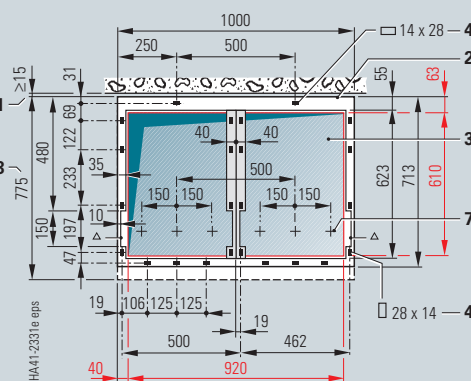
For individual panels

- For billing metering panels
 - Type ME1
 - Type ME1-K
 - Type ME1-S
 - Type ME1-KS
 - Type ME1-KK



For panel blocks

- For ring-main panel block type R-B2
- For ring-main/transformer panel block type RT-B2
- For cable connection/transformer panel block type KT-B2

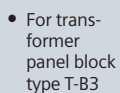
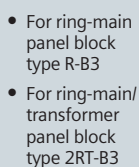


For panel block

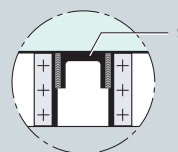
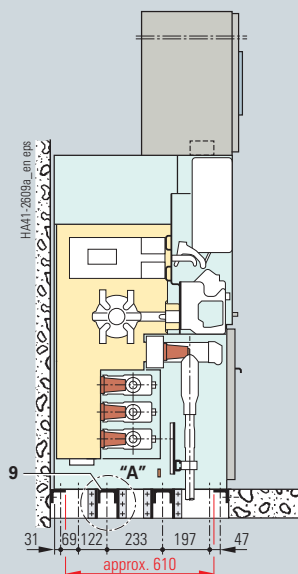
- For transformer panel block type T-B2

- 1 Wall distance
 - 2 Fixing frame (base) of an individual panel or panel block
 - 3 Floor opening for high-voltage cables (and, if applicable, control cables)
 - 4 Fixing points
 - 5 For 4MC70 33 cable-type current transformer with outside diameter 145 mm for arrangement beneath the panel
 - 6 Position of the incoming cables for metering panels type ME1...
 - 7 Position of the incoming cables for the feeder
 - 8 Overall panel depth (including cable compartment cover)
- △ Cutout in the fixing frame for extended floor opening for panel with cable-type current transformers

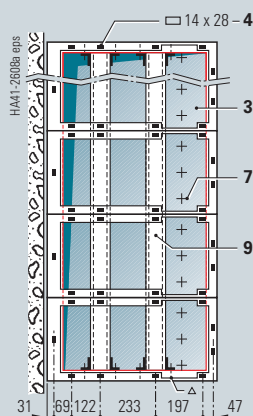
Floor openings (dimensions in red) and fixing points



- ### Example for fixing panels on the floor



Detail "A"

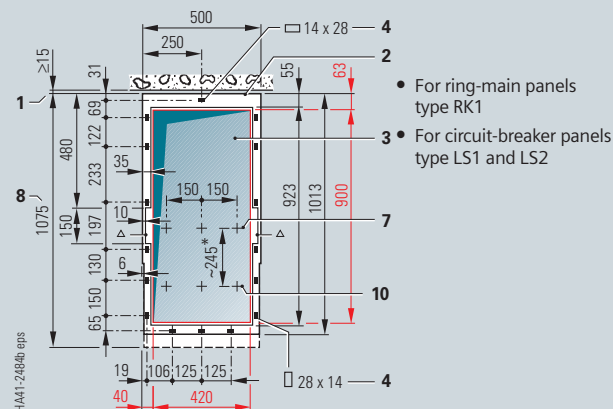
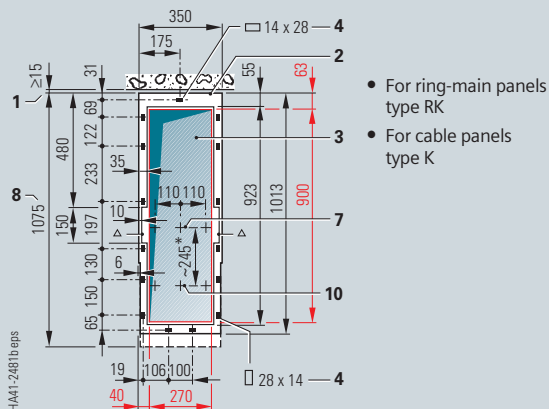
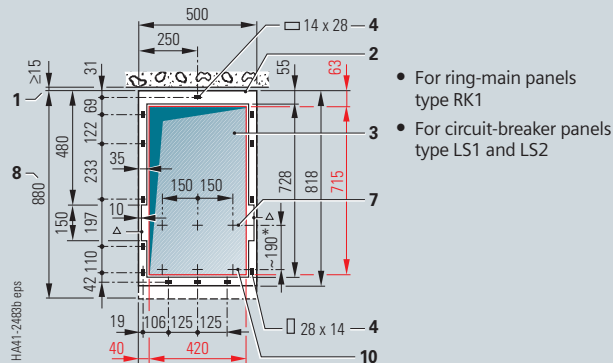
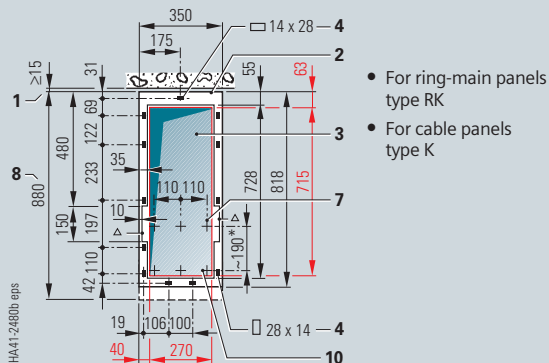
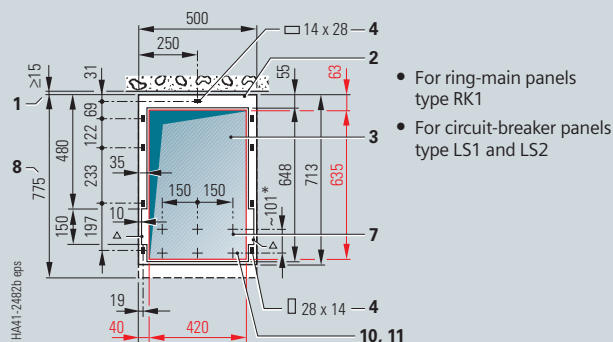
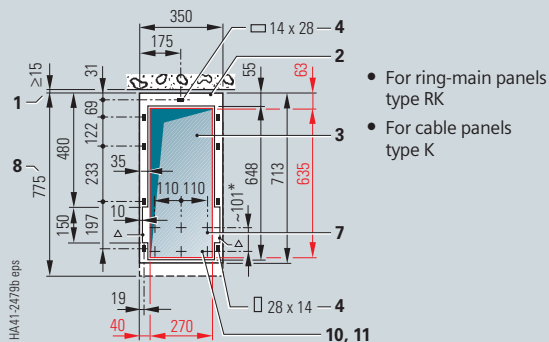
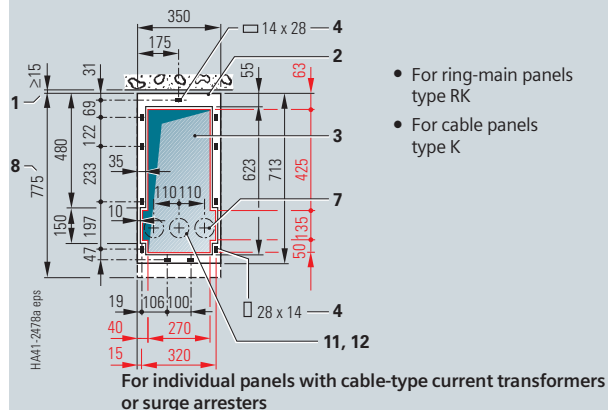


Dimensions

Floor openings (dimensions in red) and fixing points

Special versions

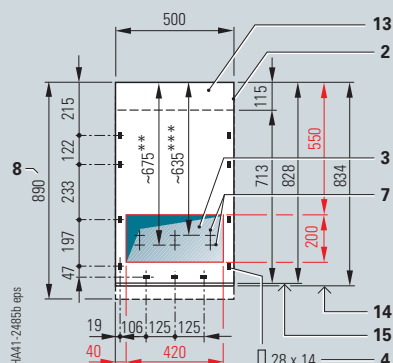
Legends and footnotes see page 39



Dimensions

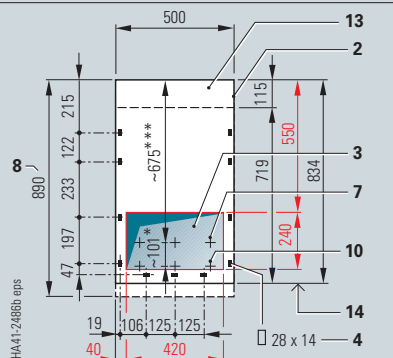
Floor openings (dimensions in red) and fixing points

Special versions in combination with pressure absorber system



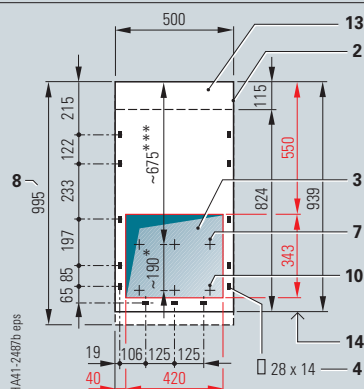
For individual panels with single cable connection

- For ring-main panels type RK and RK1
- For cable panels type K
- For circuit-breaker panels type LS1 and LS2
- For transformer panels type TR



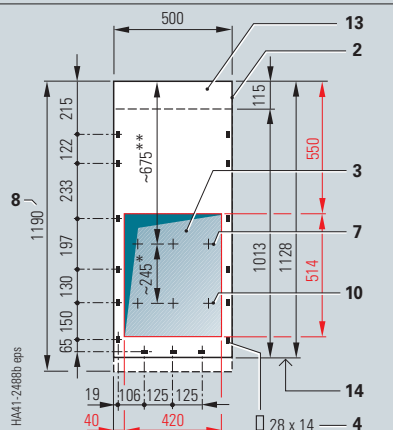
For individual panels with double cable connection
standard or 25 mm deeper
cable compartment cover

- For ring-main panels type RK and RK1
- For cable panels type K
- For circuit-breaker panels type LS1 and LS2



For individual panels with double cable connection
105 mm deeper cable compartment cover

- For ring-main panels type RK and RK1
- For cable panels type K
- For circuit-breaker panels type LS1 and LS2



For individual panels with double cable connection
300 mm deeper cable compartment cover

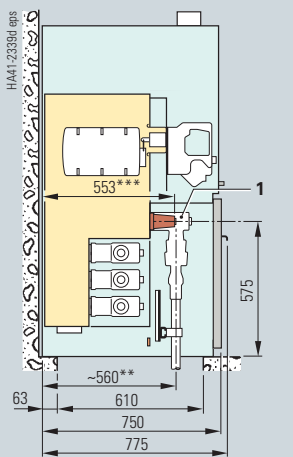
- For ring-main panels type RK and RK1
- For cable panels type K
- For circuit-breaker panels type LS1 and LS2
- For transformer panels type TR, however connection with bolted contact (M16)

- 1 Wall distance
 - 2 Fixing frame (base) of an individual panel or panel block
 - 3 Floor opening for high-voltage cables (and, if applicable, control cables)
 - 4 Fixing points
 - 7 Position of the incoming cables for the feeder
 - 8 Overall panel depth (including cable compartment cover)
 - 10 Position of 2nd cable
 - 11 For surge arrester
 - 12 For cable-type current transformers with outside diameter up to 90 mm
 - 13 Pressure absorber duct
 - 14 Front edge of base of the pressure absorber system
 - 15 Front edge of panel without cable compartment cover
- * Dependent on the type of cable plug employed
- ** For panel types RK, K and LS
- *** For panel types TR, connection with plug-in contact
- Δ Cutout in the fixing frame for extended floor opening for panel with cable-type current transformers

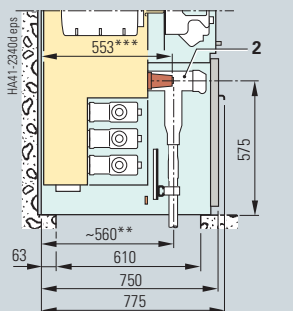
Dimensions

Cable connection examples in ring-main, cable and circuit-breaker panels
(non-binding examples, for further examples see Catalog HA 40.1)

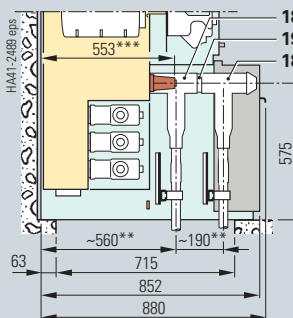
Cable connection in ring-main panel



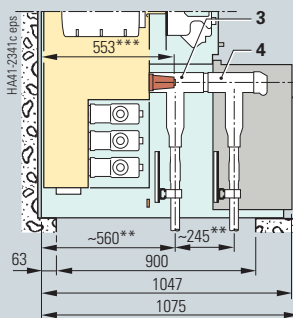
Standard cable compartment cover



Standard cable compartment cover

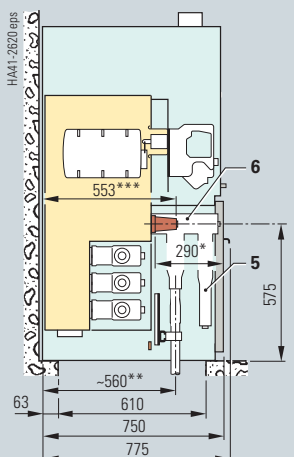


105 mm deeper cable compartment cover

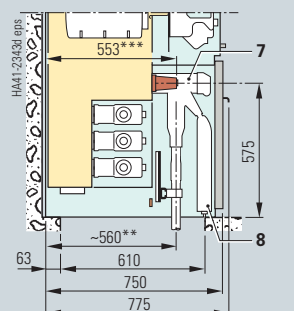


300 mm deeper cable compartment cover for double cable connection

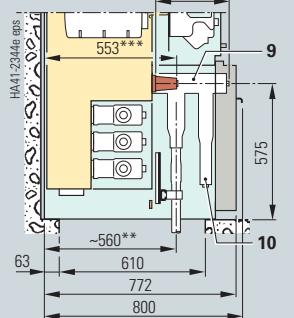
Cable connection with surge arresters



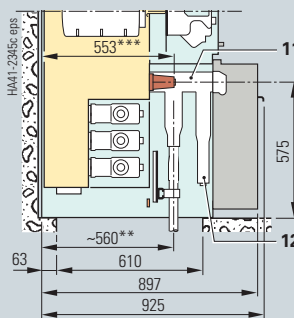
Standard cable compartment cover



Standard cable compartment cover

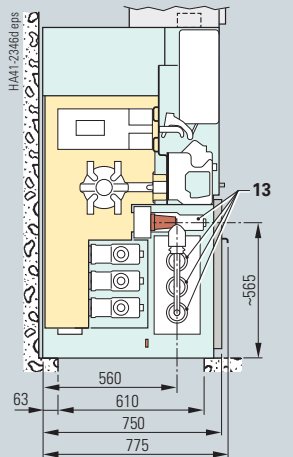


25 mm deeper cable compartment cover

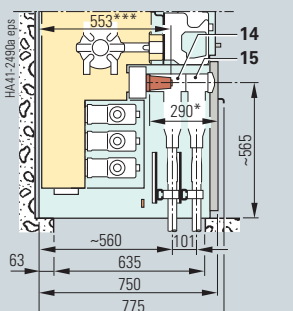


150 mm deeper cable compartment cover

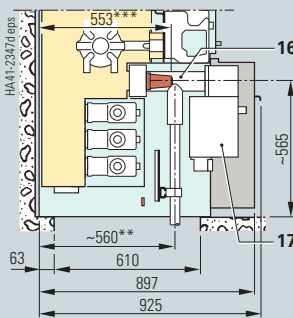
Connection in circuit-breaker panel



Standard cable compartment cover



Standard cable compartment cover



150 mm deeper cable compartment cover

1 Elbow adapter, make Siemens, type AKE 20/630 with conventional cable sealing end, make Lovink Enertech, type IAE 20

2 Cable T-plug, make Euromold, type (K)400 TB/G

3 Cable T-plug, make Euromold, type (K)400 TB/G

4 Cable T-plug, make Euromold, type (K)400 TB/G as 2nd cable (option: Cable elbow plug type (K)400 LB/G); always same make required

5 Surge arrester, make Euromold, type 300 SA-5 or 300 SA-10

6 Cable plug, make Euromold, type 430 TB

7 Cable plug, make Tyco Electronics, type RICS 5139

8 Surge arrester, make Tyco Electronics, type RDA 21 (for type RDA 24, a floor opening of 635 mm instead of 610 mm is required)

9 Cable T-plug, make Südkabel, type SET (12/24) and

10 Surge arrester, make Südkabel, type MUT (13/23) or:

9 Cable connector, make nkt cables, type AB 24-630 and

10 Surge arrester, make nkt cables, type ASA 24-5

11 Cable T-plug, make Euromold, type (K)400 TB/G

12 Surge arrester, e.g. make Euromold, type 400 Pb or similar designs

13 Busbar system for billing metering panel type ME1

14 Cable T-plug, make nkt cables, type CB 24-630

15 Coupling connector, make nkt cables, type CC 24-630

16 Cable T-plug, make Euromold, type (K)400 TB/G

17 4MT8 plug-in voltage transformer

18 Cable T-plug, make Südkabel, type SET 24

19 Coupling insert, make Südkabel, type KU 23.2

* Max. mounting space for cable plugs

** Dependent on the type of cable plug

*** Dimension for bushing as interface type "C" with bolted contact (M16)

**** Mounting depth for combination of cable T-plug and surge arrester

Overview of standards (May 2008)

		IEC standard	VDE standard	EN standard
Switchgear	8DH10	IEC 62271-1 IEC 62271-200	VDE 0671-1 VDE 0671-200	EN 62 271-1 EN 62 271-200
Switching devices	Circuit-breaker	IEC 62271-100	VDE 0671-100	EN 62 271-100
	Disconnecter and earthing switch	IEC 62271-102	VDE 0671-102	EN 62 271-102
	Switch-disconnector	IEC 60265-1	VDE 0670-301	EN 60 265-1
	Switch-disconnector / fuse combination	IEC 62271-105	VDE 0671-105	EN 62 271-105
	HV HRC fuses	IEC 60282-1	VDE 0670-4	EN 60 282
	Voltage detecting systems	IEC 61243-5	VDE 0682-415	EN 61 243-5
Degree of protection	–	IEC 60529	VDE 0470-1	EN 60 529
Insulation	–	IEC 60071	VDE 0111	EN 60 071
Instrument transformers	Current transformers	IEC 60044-1	VDE 0414-1	EN 60 044-1
	Voltage transformers	IEC 60044-2	VDE 0414-2	EN 60 044-2
	Combined transformers	IEC 60044-3	VDE 0414-5	EN 60 044-3
Installation	–	IEC 61936-1	VDE 0101	–

Standards

The 8DH10 switchgear complies with the relevant standards and specifications applicable at the time of type tests.

In accordance with the harmonization agreement reached by the countries of the European Community, their national specifications conform to the IEC standard.

Dielectric strength

See also Catalog HA 40.1 "Standards".

Terms

"Make-proof earthing switches" are earthing switches with short-circuit making capacity according to IEC 62271-102/ VDE 0671-102.

Protection against solid foreign objects, electric shock and ingress of water

The switchgear types 8DH10 fulfill acc. to the standards

IEC 62271-1	VDE 0671-1 DIN EN 60 694
IEC 62271-200	VDE 0671-200
IEC 60529	DIN EN 60 529

the following degrees of protection (for explanations regarding the degrees of protection, please refer to Catalog HA 40.1, page 38)

Degree of protection	Type of protection
IP 2X (standard)	Live parts under high voltage in switchgear with HV HRC fuses

Degree of protection	Type of protection
IP 3X (option)	Enclosure of live parts under high voltage in switchgear with locking device
IP 3XD (on request)	Live parts under high voltage in switchgear with locking device
IP 65	Live parts under high voltage in switchgear without HV HRC fuses

Type of service location

8DH10 switchgear can be used as indoor installations in accordance with IEC 61936 (Power installations exceeding 1 kV AC) and VDE 0101:

- Outside lockable electrical service locations at places which are not accessible to the public. Enclosures of switchgear can only be removed with tools.
- Inside lockable electrical service locations. A lockable electrical service location is a place outdoors or indoors that is reserved exclusively for housing electrical equipment and which is kept under lock and key. Access is restricted to authorized personnel and persons who have been properly instructed in electrical engineering. Untrained or unskilled persons may only enter under the supervision of authorized personnel or properly instructed persons.

Internal arc classification (option)

The possibility of arc faults in gas-insulated switchgear type 8DH is improbable and a mere fraction of that typical of earlier switchgear types, due to:

- Use of gas-filled switchgear compartments
- Use of suitable switching devices such as three-position switches with make-proof earthing switch
- Logical mechanical interlocks
- Use of metal-coated voltage transformers and three-phase ring-core current transformers.

Optionally, switchgear type 8DH can be designed with internal arc classification:

- Internal arc classification **IAC**
- Type of accessibility **A** (for authorized personnel only)
 - Accessible sides
 - Side **F** (front)
 - Side **L** (lateral)
 - Side **R** (rear) as an option for switchgear with pressure absorber
- Arc test current up to 21 kA / 1 s

Climate and ambient conditions

8DH10 switchgear types are fully enclosed and insensitive to climatic conditions.

- Climatic tests fulfilled in accordance with IEC 60932 (report)
- All medium-voltage devices (except for HV HRC fuses) are installed in a gas-tight, welded stainless steel switchgear vessel which is filled with SF₆ gas
- Live parts outside the switchgear vessel are provided with single-pole enclosure
- At no point can creepage currents flow from high-voltage potentials to earth
- Operating mechanism parts which are functionally important are made of corrosion-proof materials
- Bearings in operating mechanisms are designed as dry-type bearings and do not require lubrication
- Suitable instrument transformer designs
- Plug-in busbar system, insulated or screened
- Operating conditions according to IEC 62271-200, among other, relative air humidity: 95 % (24-hour mean value)
- Metering panel ME1 (air-insulated) according to IEC 62271-1: "Normal operating conditions"

Standards, Transport

Transport data, classification

Transport

8DH10 switchgear is delivered in transport units containing individual panels or several panels.

The following must be noted:

- Transport facilities on site
- Transport dimensions and weights
- Size of door openings in building

Packing

Place of destination inside Germany or other European countries

- Means of transport:
Rail and truck
- Type of packing:
– Panels on open pallets
– Open packing with PE protective foil

Place of destination overseas

- Means of transport:
Ship
- Type of packing:
– Panels on open pallets
– In closed crates with sealed upper and lower PE protective foil
– With desiccant bags
– With sealed wooden base
– Max. storage time: 6 months

Classification of 8DH10 switchgear according to IEC 62271-200

Design and construction

Partition class	PM (metallic partition)
Loss of service continuity category ¹⁾ Panels – With HV HRC fuses – Without HV HRC fuses	LSC 2A LSC 2B
Accessibility to compartments (enclosure) – Busbar compartment – Switching-device compartment – Low-voltage compartment – Cable compartment ²⁾ – Panel without HV HRC fuses – Panel with HV HRC fuses (TR...) – Panel type K – Panel without cable connection (e.g. type RK-U, LS1-U)	Access option – Tool-based – Non-accessible – Tool-based – Interlock-controlled – Interlock-controlled – Tool-based – Interlock-controlled and tool-based

Internal arc classification (option)

Designation of internal arc classification IAC for – Wall-standing arrangement (standard) – Free-standing arrangement (option)	Rated voltage 7.2 kV to 24 kV IAC A FL 21 kA, 1 s IAC A FLR 21 kA, 1 s
Type of accessibility A – F – L – R	Switchgear in closed electrical service location, access "for authorized personnel only" (acc. to IEC 62271-200) Front Lateral Rear (for free-standing arrangement)
Arc test current	Up to 21 kA
Test duration	1 s

1) The loss of service continuity category is always referred to the complete switchgear, i.e. the panel with the lowest category defines the loss of service continuity category of the complete switchgear.

2) For 8DH10 switchgear with pressure absorber:
Access to cable compartment is tool-based and interlock-controlled.
For metering panels type ME1... :
Access to cable compartment is tool-based.

If not stated otherwise on the individual pages of this catalog, we reserve the right to include modifications, especially regarding the stated values, dimensions and weights.

Drawings are not binding.

All product designations used are trademarks or product names of Siemens AG or other suppliers.

If not stated otherwise, all dimensions in this catalog are given in mm.

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